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No 9, SEPTEMBER 1986

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WEST GERMAN INTELLIGENCE AGENCIES EXAMINED

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 9, Sep 86 (Signed to press 10 Sep 86) pp 3-8

[Article by Col A. Tsvetkov; "West German Special Services--Weapon of Aggression and Revanchism"]

[Text] A necessary condition for stability in the positive processes in Europe and in other regions is a respect for the territorial-political realities which came about as a result of the Second World War. The CPSU, as emphasized in the Program of the Communist Party of the Soviet Union, decisively against attempts to revise them under any pretense, will quash any appearance of revanchism.

This serious reminder is directed primarily to the FRG where revanchism became a component part of state politics of the ruling coalition CDU-FDP. The idea of "restoration of the great Germany" is openly supported by NATO circles, principally the U.S. It was with great satisfaction that the West greeted the new long-term Bundeswehr development program (1985-1997), the principal goal of which is to increase the strike power of the West German Army by rearming it with the latest weapon systems, including precision ones, and combat equipment for realization of far-ranging revanchist plans.

The leadership of the FRG fully supports plans to militarize space and has concluded an agreement with the United States on participation in the "star wars" program. Most of all, the West German minister of Defense Worner has advanced a proposal to create the so-called "European system of defensive space weapons," which would supplement the American system.

The FRG's militaristic preparations in recent times are closely connected with the activities of its special service which appears as an active weapon for preparation of aggression and revanchism. As noted in the foreign press, West Germany became the very launch pad for imperialist spying in Europe and the main base for subversion directed against countries of the socialist fraternity.

Among the many intelligence, counterintelligence, diversionary and nationalistic organizations in the FRG, a special place is held by the four special services--federal intelligence service, military intelligence, federal

department for protecting the constitution, and military counterintelligence. These are official organizations operating in accordance with special legislation and declarations of the Bundestag and the government. Several general characteristics can be ascribed to them. First, they all sprang from the basis of Hitler's intelligence and security services, and are raised in their traditions; second, their activities in and out of the country bear a totalitarian nature; third, they conduct subversive activities in close contact with analogous organizations in NATO, especially the U.S.; fourth, all the special services of the FRG pursue one goal--the creation of favorable conditions for accomplishing the revanchist intents of West German imperialists.

The principal national intelligence agency is the Federal Intelligence Service (Bundesnachrichtendienst)--BND, formed in 1956, located in Pullach (near Munich). It has a staff of more than 5,000. It is directly subordinate to the chancellor of the FRG through the State Secretary.

As shown in the foreign press, the BND has the following responsibilities: obtaining intelligence on the politics, military-economic potential, and armed forces of foreign countries, primarily the socialist countries; organizing diversions at the most important economic and military entities in the countries of likely opponents; ideologically influencing the population; terrorist acts; counterintelligence among allies of the FRG and FRG government personnel abroad.

The structure of the BND, in accordance with its missions, comprises four departments (intelligence, operational-technical, information-analysis, and administration). The intelligence department is considered the main one. It includes several sub-departments, divided into bureaus and sub-bureaus, whose work is organized by function and territory. Several of the bureaus specialize in obtaining intelligence about the USSR, and one of them operates against the socialist countries' state security organs.

The territorial organizations of the BND, located in West Berlin (although it has special international status and is not a part of West Germany) and major cities in the FRG, for example, Munich and Hamburg are subordinated to the bureaus of the first department. Their subversive activities are directed against the USSR.

Provincial BND organs usually are disguised as various firms, societies, and enterprises (specifically, the labor union "Argo," in Hamburg, a factory for producing venetian blinds in Karlsruhe, etc.). Locations of these organizations is often changed. Special organizations for recruiting agents from the citizenry of the socialist countries exist in the local organs.

The BND's main efforts are directed at obtaining military-political information on socialist forces deployed on the territories of the GDR, Hungary, Czechoslovakia and Poland as well as on armies of the Warsaw Pact. Suffice it to say that, for example, in 1984, security organs in the GDR exposed and neutralized substantially more spies and subversives from the BND than in 1983. Here are just two examples of intelligence and subversive activities of the BND against the GDR which which were reported in the German

Democratic Republic press. R. Krants, a BND agent from Furstenwald, who gathered data on units of the National People's Army, where he served as a civilian radio repairman, was exposed by GDR security. Another BND agent, O. Warmut, received a mission to enter the territory of the GDR to gather military information, especially about the location of Soviet missile units.

The special service of the FRG Christian Socialist Union, headed by the well known Stauss, is a self-styled branch of the BND. The West German journal DER SPIEGEL reported on it to wide circles of society in 1982. Judging by its reports, the Special Service of the CSU, which was founded in the early 70s, supports contacts with analogous organizations outside the country. Working closely with it is the so-called "Circle for the Study of International Problems," whose principal leader was Brigadier General, retired, V. Langkau (who earlier led one of the services of the BND.)

The intelligence service of Stauss' party, as the Western press notes, has its people in the leadership of the Bundeswehr and military-industrial concerns, thanks to which the Christian Socialist Union spreads its influence far beyond the borders of Bavaria. For example, it has been shown that a former coworker with the BND, Langeman, gave the Christian Socialist Union major support. Langeman served more than ten years in intelligence and in the early 60s, headed the security service in Bavaria. In 1982, the CSU achieved the removal of Kinkel from the leadership of the Federal Intelligence Service and the naming E. Blum to his position. The latter, as reported in the press, is a proven agent of the American CIA and a friend of Stauss.

The BND's spy department, either directly or covertly, is mixed up in the unseemly business of foreign arms sales. It is reported in the foreign press that, with the help of the firm "Mereks," in 1967 alone, it managed to sell obsolete Bundeswehr weapons in the amount of 38 million dollars to one of the "hot spots" of the time, Pakistan, opponent of India. Now the BND, together with the special services of the U.S. and Italy, practices weapons sales to the Afghans. It isn't accidental that in recent years the firms "Flika" and other moneybags "welcomed" the sovereigns of "cloak and dagger" on the order of more than 400,000 West German marks.

Expansion of the militaristic preparations of the FRG in accordance with the demands of the NATO political-military leadership required serious restructuring of the West German intelligence. In particular, in April of 1985, formation of the department of Army intelligence (Amt Nachrichtenwesen der Bundeswehr), ANB, subordinate to the Supreme Headquarters of the Armed Forces. It is located in Bad Noienar (near Bonn). The ANB staff numbers over 2 thousand.

The fundamental missions of the ANB are, as reported in the West German journal DER STERN: organization and conduct of electronic intelligence; deciphering codes of foreign countries; gathering and processing information of a military nature; coordination of the armed forces' radio-technical intelligence assets; conduct of RTD&E on creating radio-intelligence assets and providing security and secrecy in communications.

The organization of this department consists of the headquarters and six independent sections. The basic working elements of the headquarters are the intelligence planning section and the translation and documentation service. Also indirectly subordinate to it are support services: signal, supply, transport, etc.

The first section of the ANB decides about exploiting radio reconnaissance data and organizing the defense of their own assets. The second section conducts reconnaissance of the most important general military targets of a potential enemy; and the third, fourth and fifth--the ground forces, air forces and navy, respectively. The sixth section processes and does detailed analysis of information obtained. The latter also maintains two card files: one records all incoming and outgoing documents relating to the work of the ANB, and the other records data on all department personnel including former employees.

Employees of the ANB must meet high standards, including complete political reliability, moral strength, no compromising history, and high qualifications. They are denied trips into socialist countries or through their territory, as well as presence at combat activities.

To fulfill their missions, the ANB uses modern electronic intelligence arraratus both on FRG territory (especially in those areas bordering the GDR and CSSR), and in aircraft, vessels of various classes, embassies, missions, and other West German representatives abroad. According to the Western press, these reconnaissance means are capable of intercepting radio and radio relay transmissions on practically any wave length, and locate radars and other enemy stations. All intercepted traffic is processed in computers and quickly transfered to the appropriate authority.

The principal FRG counterintelligence agency is the Federal Department for Protection of the Constitution (Bundesamt fur Verfassungschutz)--BFV, located in Koln. It was established in 1950 and has about 2,000 personnel on its staff. This agency accomplishes such missions as control of the German Communist Party and other social organizations and citizens of the FRG, action against extreme and territorial organizations and groups, security of important state secrets, surveillance of foreigners on FRG territory, and intelligence activities against the GDR by recruitment of agents from among its citizens.

The organizational structure of the central apparatus of the BFV corresponds to its missions, resulting in the following sections: administration, countering extremists on the right, countering extremists on the left, counterespionage, security, surveillance of foreigners, and counterterrorism.

District departments for defense of the constitution are located in all of the districts of the FRG and West Berlin. They are subordinate to the Ministry of Internal Affairs of the district (in West Berlin to the senator of internal affairs) and number about 3,700 workers.

The budget of the BFV grows unceasingly. If it amounted to 77.8 million marks in 1976, then by just 1984, it had grown to 178.5 million. These funds are

used to maintain the counterintelligence cadre as well as paying 31,000 secret agents.

Since the reactionary powers have conducted a broad attack on the rights of workers, including in the FRG, they have sharply increased the activities of their special services. In a Central Committee political speech, at the CPSU 27th Party Congress, it was emphasized that in these countries "leftists and any progressive forces are persecuted. The norm has become constant control, more exactly, shadowing the minds and behavior of people." Practically the entire adult population of the country is under the vigilant eye of the Bonn special service. Dossiers are maintained on nearly 20 million West German citizens in secret files and computers. Annually the BFV checks the centents of 1.5 million letters. Between 1972 and 1986, 3.5 million FRG citizens underwent humiliating checks for "political reliability." As a result, 10,000 people were discharged from work or placed under threat of firing. By such methods the FRG secret police deals with those who are not in agreement with the military preparations and revanchist politics of the current ruling coalition of the CDU/CSU-FDP.

Official Bonn tries to squeeze its illegal activities into the "bounds of legality." The package of bills now slinking through the Bundestag on "internal security" should give still greater authority to the special service over the daily lives of not just servicemen but all FRG citizens.

Three of the seven bills had, at the beginning of 1986, already proceeded through the Bundestag and been approved by the Bundesrat. According to one of them, a new identity card will be introduced for West German citizens in April 1987, which can be read in several seconds by a computer. It is not accidental that the West German jurist Professor Yu. Seifert called the new bills "extreme legislation."

Along with the mission of conducting political investigation, the BFV fulfills important intelligence functions in collecting and processing information on the military-economic potential of the GDR, its most important governing bodies and The People's Army, and also on the Group of Soviet Forces in Germany. The BFV dispatches its agents into the GDR and other countries of the Warsaw Pact amongst various delegations, under the guise of tourists, businessmen, etc.

The functions of political security in the Bundeswehr, territorial defense forces, and industrial enterprises producing military goods are carried out in the FRG by the Military Counterintelligence Service (Militarischer Abschirmdienst) - MAD, founded in 1956, after the FRG joined NATO. The central headquarters of the MAD is located in Koln, and it has a staff of about 2,500. The Service is indirectly subordinate to the Ministry of defense through the State Secretary.

The leaders of the Bundeswehr have given MAD the following missions: protect FRG military secrets in the armed forces, in military industrial enterprises, and in scientific research institutes developing weapon systems; checking reliability of servicemen and civil servants of the Bundeswehr; conducting counterintelligence against foreign states, primarily socialist ones;

organizing and conducting intelligence-diversion activities in the armies of the Warsaw Pact. According to a law recently adopted by the Bundestag, this Service has the same right as the BFV to conduct political investigations among the citizens of the FRG.

In 1984, military counterintelligence in the Bundeswehr underwent a partial reorganization. Its leading organ, the directorate of Bundeswehr personal security, was converted to a directorate of military counterintelligence. The double subordination of the MAD was initiated: to the State Secretary of the Ministry of Defense on counterintelligence activities, and to the deputy inspector general on personnel matters and for technical support. New positions were created: Deputy Commander of MAD for political investigations among civilians, and MAD Chief of Staff. Local organizations were reorganized and made subordinate to MAD.

The headquarters for the Military Counterintelligence Service consists of five functional departments, which develop measures to counter espionage in the armed forces and industrial enterprises, checking reliability of personnal of the Bundeswehr and military industry, organizing control over subordinate organizations, analysis and generalization of the practice of counterintelligence work, and accomplishing other functions.

Seven operational organizations (groups) are subordinate to the counterintelligence service. Six of them operate in military circles in the FRG, and a "special group," located in Bonn, protects important Bundeswehr institutions in the national capital. Each group has a headquarters, three operational detachments (checking personnel, investigating espionage, and checking communications for facts on espionage and correctness of information), a platoon for communications and command and control. In the subordinate groups, there are 10 commands (each having about 200 people), conducting observation of places of interest to the MAD, and monitoring mail and telephone conversations. The formations of all branches of the armed forces have MAD organizations, in units there are security groups, and in independent organizations there are security officers.

Also, MAD conducts all-around counterintelligence to prevent the politics of unreliable elements from penetrating the Bundeswehr. In this connection, by a special mandate of the FRG government, it is responsible to check military and civilian personnel of the Bundeswehr and young people subject to the military draft.

MAD very scrupulously investigates the personal affairs of the Bundeswehr officers. As one of the West German military journals noted, this investigation is conducted so carefully that checks on the affairs of just 500 officers took over a year and a half. Especially rigorous checks are made of their biographies, their political views, temperament, relatives, acquaintences, etc. All young people drafted into the Bundeswehr for active military service undergo these humiliating checks. For exammple, in 1982, more than 200,000 people were subjected to such procedures.

MAD religiously pursues those German citizens who speak out aginst the militarization of the FRG. It arranges special studies of the most active

pactifists. As noted in a recently published book, DETECTIVES, FALSIFIERS, AND PROVOCATEURS, by F. Seibert, the MAD files contain more than 50,000 FRG citizens in it, among which are the writer B. Engelman, popular artist D. Hildebrant, the now deceased pastor Niemuller, and others.

The military counterintelligence service of the Bundeswehr formally must engage in collection of information within the country, but it conducts espionage outside the country also, widely recruiting foreign citizens, mostly from the countries of the Warsaw Pact. Also, this agency infiltrates specially trained agents into the territory of socialist nations, the number of which should grow sharply during a period of increased tension of the beginning of a war. As the West German publicist W. Wener reveals in his book, SECRETLY. GERMAN INTELLIGENCE AGENCIES IN DOCUMENTS, the Bundeswehr leadership is sent "not just internal reports of counterintelligence, but also reports from abroad."

The West German special service maintains comprehensive contact with intelligence in the NATO countries, most of all American. Dozens of U.S. and bloc intelligence operations are active on the territory of the FRG. The former deputy chief of one of the sections of American military intelligence in West Germany, W. Svoboday (who broke away following this assignment), revealed that under CIA control, agents of all U.S. armed services operate in this country, and that they have people in practically all the major cities. Espionage and diversion occupy many American organizations which are disguised on the FRG territory as various inoffensive enterprises.

The operations of this complex and well-developed espionage system are led by the European headquarters of the CIA, located in Frankfurt am Main, from which it maintains constant contact with the FRG special service.

Specifically, the BND and ANB regularly inform American intelligence on their information on Warsaw Pact armed forces. The BFV and MAD, operating under various pretexts, organize meetings of overseas agents with citizens of the socialist countries who have emigrated to the FRG. During such meetings, CIA agents attempt to extract information of a military and economic nature of interest to them.

Attempting not to lag behind their "patrons," the British and other NATO intelligence agencies, also having established their branches and representatives in the FRG and carrying on from there disruptive activities against the socialist states, support a number of control processes over Western intelligence agents in Poland, the GDR, and Czechoslovakia.

A European coordinating committee, subordinate to the NATO military committee standing group, which is located in Washington, has been formed to exchange intelligence data between agents of the NATO countries and plays an important role on the North Atlantic alliance decision making.

The highest organ of strategic intelligence for the Western powers in Europe is the intelligence directorate of SHAPE located in Brussels (Belgium). Various organs in the NATO secretariat also fulfill intelligence functions to one degree or another.

This is, however, only the surface side of cooperation between NATO intelligence. It is very paradoxical that FRG special services often outbid agents of other Western powers, receiving information from them earlier than they do from their own channels. Moreover, the widespread net of agents from the U.S., Britain, and the other NATO countries on German territory, help the West German intelligence organs not only to receive information of interest to them, but also to collect information on agent communications of their allies, in order more easily to penetrate them. Thus, it has been reported, Gleske, an agent of the BND, received an assignment to recruit agents amongst English intelligence in West Berlin. In carrying out this mission, he established a connection with an English agent named Buse, and recruited him to work in West German intelligence. Then Gleske was assigned to make contact with former BBC employees to obtain secret information from them. Gleske fulfilled his assignment.

The FRG, which, in recent years, has been turned into a jungle of espionage, is, thus, a place of not only close cooperation of NATO intelligence, but also a bitter, behind-the-scenes battle between them, which, according to the growth of the military potential of the FRG and its influence in NATO, takes on an ever-sharper character.

German imperialism, twice having pushed mankind into the abyss of a world war, and again gathering strength in West Germany, is becoming still more impudent. Having lost their sense of reality, the West German militarists have chosen as their main political course revanchism and aggression, giving birth to adventuristic plans for the violent changing of national borders in Europe.

Together with the growth in the FRG of militaristic and revanchist forces, their espionage and subversion activities against the socialist countries and their special services, direct descendents of Hitler's gestapo, are being activated. Directly serving the political system and Bonn's military machine, the FRG special services, from day to day, activate their subversive work, trying by whatever means available to penetrate the military and state secrets of the countries of the Warsaw Pact, and to undermine their defensive capabilities.

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USSR SEEKS 'DECREASE OF TENSIONS' ON KOREAN PENINSULA

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 9, Sep 86 (Signed to press 10 Sep 86) pp 9-12

[Article by Lt Col I. Kosintsyn; "South Korea: The Escalation of Militarism"]

[Text] The tense politico-military situation on the Korean peninsula, being sustained by ruling circles in the U.S. and their puppets in Seoul, is cause for serious concern by the progressive world community. The increased American military presence here, combined with Washington's and Seoul's peristent reactionary view toward peaceful democratic unification of Korea, the militarization of economic and sociopolitical life in South Korea and the provocative intrigues launched from her territory against the Korean Peoples Democratic Republic (KPDR), are all fundamentally responsible for the over three decades worth of relentless military turmoil on the peninsula. This region of Asia urgently needs firm practical measures to, as stated in the 27th session of the CPSU, "deescalate the military confrontation there."

As recent events have demonstrated, however, the Reagan administration and its allies are stubborn in their refusal to renounce their dangerous and hopeless policy of force, and are continuing to pursue a course toward creating a different type of "Axis" in the Asian-Pacific region, a "triad" and other exclusive coalitions for military and anticommunist purposes. To achieve their hegemonistic goals, Washington is trying to break out of strategic military parity and achieve military superiority over the USSR, notably in the Far East. The buildup of U.S. military forces in the Pacific is being accompanied by a policy to strengthen the military capabilities of U.S. allies in the region and to consolidate them around Washington's aggressive strategy.

By virtue of its geographic position, South Korea, serving as a U.S. military bridgehead in the Far East aimed against adjacent countries, is considered one of the most important military bases for American imperialism. It was no accident that, during a 1983 visit to Seoul, President Reagan boasted that South Korea was "a vitally important zone" of prime significance to Washington's interests in that part of Asia. Such is the view of South Korea's role in the Washington-Tokyo-Seoul anticommunist block, an entire politico-military structure, which, although not legally established, actually functions and is developing as a relatively solid politico-military structure.

The diplomatic underpinning of the bipartite polico-military tie between American and South Korea is manifested in the so-called "mutual security" treaty which was concluded on 1 October 1953, and subsequently reinforced by a series of other military agreements. With the help of these imposing "treaties" and "agreements," Washington legitimized South Korea's political, economic, and military dependence on the U.S. and her virtual occupation by American troops. The U.S. military presence has secured the country's partition into north and south and has become an impediment to achieving national unity under peaceful and fair circumstances without external interference. Under Washington's orders, the Seoul regime has loyally sabotaged and continues to obstruct numerous initiatives on the part of the KPDR directed at providing stability and security in Korea. Contrary to the majority of world opinion and against the will of most UN representatives, the United States has sought to prevent the fulfillment of UN recommendations calling for the withdrawal of both UN military forces and U.S. troops from Korea and for a peaceful armistice agreement to take their place.

In order to further their goals of strengthening the American military presence in South Korea, the White House is using as a false pretext the necessity of present and future U.S. participation in the Seoul regime's "defensive security" from some kind of "threat from the North." The real principal motivation for U.S. policy on the Korean peninsula is the defense of American monopoly interests and their desire to hold onto, at any cost, what is viewed by the Pentagon to be an extraordinarily advantageous base near the borders of the Soviet Union and other socialist countries of the Far East. R. Person, the famous American expert on Asian affairs, candidly stated that, "It is perfectly clear that the forward line of defense in East Asia and the western part of the Pacific must rest on the firm support of South Korea." The U.S. Secretary of Defense, Caspar Weinberger, catagorically declared that "the stationing of American forces in South Korea is not a topic for discussions with the KPDR since it is a part of a military pact between the U.S. and South Korea."

At present, a contingent of 40,000 U.S. troops are concentrated in the southern end of the Korean peninsula, distributed among over 200 military bases and establishments. With the Pentagon's help, South Korea created its own type of regional "powder keg." An entire complex of bases for tactical nuclear weapons has been built there. Over 1,000 individual nuclear warheads are stored there with a destructive power that is 820 times greater than the atomic bomb dropped by the Americans on Hiroshima. Washington is not only against any kind of force reductions in South Korea (as was promised but not carried out during the Carter administration), it is headed in the opposite direction by taking active measures to qualitatively improve their armed forces by equipping them with new conventional and nuclear weapon systems. Thus, according to the foreign press, they are stubbornly advancing with plans to deploy Pershing II first strike missiles, cruise missiles, and neutron warheads. Judging from a statement by former U.S. Army Chief of Staff Meyer, the commander of American military forces in South Korea is endowed with the prerogative to independently decide whether to use nuclear weapons under so-called "extraordinary circumstances." This fact is proven by the criminal contempt with which the American ruling clique regards the destiny of the

Korean and other peoples of the Far East. South Korea is, in reality, a nuclear hostage of the Reagan administration's adventurist policies.

Washington has spared no effort in strengthening the military capability of South Korea itself. The annual amount of official U.S. military aid to Seoul over the past five years has been increased in monetary terms several fold, hitting the record figure of 240 million dollars in 1985. From 1985 to 1989, the U.S. plans to provide South Korea with 8 billion dollars of military hardware including F-16 fighter-bombers and HAWK and TOW missiles. For the sake of comparision, according to data in the foreign press, U.S. economic and military aid to the Seoul regime from 1945 to 1985, amounted to 11 billion dollars.

Ruling circles in the U.S. are trying to bring Japan into their dangerous adventurist plan, calling on her to "share responsibility for South Korea's security." The treaty which normalized relations between Tokyo and Seoul, concluded in 1965, formed the basis for establishing close ties between them. It has since taken on a decidedly militaristic nature. A Japanese-South Korean parliamentary council was formed in 1979 to address matters of security. Japanese military observers have routinely been present at American-South Korea TEAM SPIRIT exercises since 1979.

Activities to strengthen the Japanese-South Korean side of the Washington-Tokyo-Seoul military triad have been especially intense during the 1980s. When Japanese Prime Minister Nakasone and South Korean dictator Chun Doo Hwan exchanged visits, they specifically discussed the issues related to strengthening bipartite politico-military cooperation. Time and again, the foreign press has gone on to report that the Japanese and American military establishments have already prepared plans to transport and deploy Japanese armed forces on the southern end of the Korean peninsula. There is talk of organizing tripartite American, Japanese, and South Korean naval maneuvers to rehearse blockading international straits in the Far East.

It goes without saying that today Japan is the principal lender, investor, and trading partner with the Seoul regime. The Japanese government has loaned Seoul 4 million dollars for military purchases. It is quite obvious that the South Korean regime's economic dependence on the U.S. and Japan is helping the imperialists strengthen this link of the military "triad" and ensure conformance to the assigned role" in the military preparations of its members.

The South Korean administration, in connection with increasing internal opposition to its dictatorial regime, has been particularly zealous in its attempt to demonstrate devotion to Washington's military strategy. Seoul is calling on a number of active American supporters to consider the idea of creating a "Pacific Ocean Association," the proposed members of which would include the U.S., Japan, Canada, Australia, New Zealand, Indonesia, Thailand, the Phillippines, Malaysia, Singapore, South Korea, and possibly other non-socialist countries in the region. While propagandizing the concept of a new regional group which, in the future, might well turn into yet another militaristic block, Chun Doo Hwan has worked since the early 1980s for a "unionification" effect involving the powerful ASEAN countries, with their plentiful resources, and the industrially developed imperialist states of that

region. Judging from the foreign press, Seoul has responded in principle to an American plan dubbed the "regional defense initiative" in the Far East which will pave the way for Japanese and South Korean involvement in the development of "Star Wars."

The South Korean government, steadfastly obedient to the executive will of the American ruling clique and using their military and economic support, has developed and vigorously implemented a program to boost the country's military-industrial capacity. Frightened by the fall of South Vietnam's puppet regime in 1975, South Korea's then dictator Park Chung Hee promoted the "augmentation of national forces," under the guise of which a campaign was launched to build a powerful modern military industrial base and to militarize the country. Practically all able-bodied adult members of the population were drafted into a war mobilization system which involved military formations such as a local reserve force (3.3 million men), a "civil defense corps" (4.4 million men), and a "student association for national defense" (1.8 million). Military drills became an integral part of school education programs, where no less than two hours per week were devoted to it.

Within the framework of South Korea's current second five year plan for building military might, the main emphasis is on improving their military capability by means of equipping units with more modern arms and high technology equipment. According to official statistics, 1.95 billion dollars have been allocated to achieve this goal. Seoul plans to be completely self-sufficient in satisfying its own ordinary material-technical needs for their armed forces through domestic industrial output by the beginning of the 1990s. Indeed, the feverish arms race which has been waged by South Korea over the past few years has weighed heavily on the shoulders of the working class. Seoul's military outlays comprise 40 percent of the national budget. In 1985, they exceeded 5 billion dollars.

The South Korean armed forces have, by their own account, become one of the foremost amongst the capitalist Asian countries in terms of manpower and equipment. According to information attributable to official Seoul sources, the armed forces comprise more than 600,000 men: 520,000 in the ground forces, 33,000 in the air force, and 45,000 in the Navy (including naval infantry). The army's organizational structure was modeled after that of the Americans. The period of active service in the army and naval infantry is 2.5 years, and 3 years in the air force and navy. A strong, well-trained reserve force comprised of various types of units was created which numbers over 1.5 million men. The South Korean military has 1,200 tanks, over 3,000 artillery pieces, 1,300 individual anti-tank weapons, about 450 combat aircraft, and 150 ships.

The commander-in-chief of South Korea's armed forces, whose authority is channeled through the minister of Defense, is the head of Seoul's political administration. Actual direct operational control over South Korea's military, however, is in American hands. In 1978, an American-South Korean joint command was established, headed by the commander of U.S. forces in South Korea, which had authority over all forces deployed on South Korian territory. One of this command's most important peacetime missions is to conduct annual large-scale, extended (2 months or more) exercises in the southern end of the peninsula which are known by the code name TEAM SPIRIT. During the latest of

these, which was held from 10 February to mid-April 1986, there were 209,000 service personnel employed, nearly 30 ships, a large number of aircraft and other military hardware. To further reinforce the American garrison in South Korea, strike forces were brought in from the continental U.S. and bases throughout the Pacific. Over the course of these war games, simulated "nuclear strikes" aginst KPDR territory were carried out in conjunction with other missions.

Exercise TEAM SPIRIT-86 was not just a military provocation but also a political one, an impudent challenge to the KPDR government, who had invoked a moritorium on exercises of their own during the period of negotiations between P'yongyang and Seoul. The American leadership and their Seoul puppets once again confirmed their disinterest in continuing a peaceful dialogue between the North and South.

Obviously, the pronounced aggressive nature of the TEAM SPIRIT exercises is regarded by foreign authorities as a means of deliberate aggravation on the part of Washington and Seoul, a politico-military confrontation with Socialist countries, and a detriment to the foundation of security in the Asian-Pacific region.

South Korea's armed forces, together with its political apparatus, are responsible for keeping the present dictator, Chun Doo Hwan, in power. Factions and elements of the army have time and again rushed to the aid of police and security forces to put down anti-government uprising by the workers. In order to win the support of South Korea's servicemen to do the dirty work associated with the Seoul clique's external political policies and internal skull duggery, they are subjected to intensive idealogical indoctrination as part of their training. They are trained to be vehemently anti-communist, chauvinistic, and devoted to the dictator's regime. They are instilled with particular hostility towards the KPDR, the Soviet Union, and other socialist countries and inculcated with the "usefulness" and "necessity" of South Korea's politico-military alliance with the U.S. and Japan. To this day, the veterans of the aggressive war aginst the Vietnamese people are honored in the South Korean army as "heroes." It was in Vietnam that Seoul puppet forces employed "scorched earth" tactics.

The army's political role is growing in connection with the exacerbation of the dictatorial regime's crises. Born and reared by Washington, it has become one of the world's leaders in scandelously trampling human rights. A massive anti-government movement is growing in a struggle for democratic freedom and also aginst the American military presence in South Korea. Many hundreds of thousands of South Korea's people have already signed a demand to abolish Chun Doo Hwan's puppet regime.

Foreign experts believe that the course of events in South Korea will largely depend on the position taken by the American administration. Judging from a series of indications, Washington is not adverse to applying the tactic of saving South Korea from this regime in order to preserve its own position there. For example, the American press has dropped hints to the effect that if Chun Doo Hwan cannot cope with the extent to these popular uprising, he may "suffer the fate of Duvalier and Marcos." It is considered, however, that

even having agreed to make chun Doo Hwan a scapegoat, the American administration will spare no effort to prevent any change in South Korea's role in the overall strategy of American imperialism in the Far East.

While attempting to stick to his own interests but at the same time also receive "goodwill" from his cross-ocean patron, Chun Doo Hwan is actively making cosmetic repairs to his dictatorship's facade of. The government underwent a periodic reshuffling in August 1986, the second of this year. This time Chun Doo Hwan fired nearly half of the members of his cabinet. Simultaneously, a plan for a new constitution was submitted for parliamentary review. These measures however, as proven by past experience, take on a particularly utilitarian nature intended to placate civil unrest and mislead international public opinion with the appearance of democratic changes. In reality, they serve to consolidate and strengthen the domination of South Korea by the ruling party and Chun Doo Hwan himself, and to legitimize the military dictatorship and the country's militarization.

As yet another sign of Washington's and Seoul's reluctance to undertake concrete actions to defuse the situation in the region, world opinion witnessed their negative reaction to the KPDR's new peace initiative (at the end of June 1986), designed to mollify the explosive situation on the Korean peninsula and establish conditions conducive to the country's peaceful reunification. The KPDR government offered to conduct three-way negotiations between the leaders of the KPDR, South Korea and the U.S., which would have addressed questions such as suspending military exercises and halting troop buildups, force strength and arms reductions, and strict observance of armistance agreements in Korea.

It was also proposed that the Korean peninsula be turned into a peaceful nuclear-free zone. To this end, the KPDR government unilaterally proclaimed that they will refrain from testing, production, importation, and deployment of nuclear weapons on their territory and likewise forbid the transportation of them through it, and called on the U.S. to discontinue importing nuclear weapons into South Korea, for phased reductions of all such weapons deployed there and to renounce plans for using nuclear weapons in Korea.

The Soviet Union's position on the Korean question is well known. The USSR invariably comes out in favor of taking positive steps to alleviate the dangerous state of tension on the peninsula such that Korea be united on a peaceful path toward democracy following the withdrawal of American troops from South Korea.

Appearing in Vladivostek on 28 June 1986, USSR Central Committee General Secretary, M.S. Gorbachev, advanced an overall program which included the Asian Pacific region in a process to build a comprehensive system for international security. It envisions resolving regional questions, creating a barrier against the proliferation and buildup of nuclear arsenals in Asia and the Pacific, holding talks on the reduction of naval operations in the Pacific Ocean, primarily ships carrying nuclear weapons, radical reductions in nuclear forces and conventional arms in Asia, and discussion on measures of trust and abstenance of applying force in the region.

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ISRAELI ARMED FORCES STUDY DELAYED STRESS SYNDROME

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 9, Sep 86 (Signed to press 10 Sep 86) pp 12-14

[Article by Col Yu. Dedov and Col L. Yartsev; "Psychology in the Service of the Israeli Interventionists"]

[Text] Israel's aggressive acts against Arab nations are accompanied by a display of massive outrages toward peaceful citizens; by barbarous, sadistic extermination of innocent people; and by multiple acts of vandalism. Having placed its Zionist ideology into service for its expansionist objectives, the Tel Aviv leadership has converted the personnel of its armed forces into the primary executor of its misanthropic, militarist plans. A spirit of racial superiority, extreme cruelty and hatred for the Arabs which found its practical expression in the criminal, inhumane acts of Israeli soldiers and officers during their aggression in Lebanon, is propagated by all means possible within the Israeli Army.

The Israeli leadership has always considered the moral spirit of its army to be its hidden, secret weapon and has paid considerable attention to that point. Recently, a particular significance has been given not only to the ideological, but also the psychological aspect, the study of personnel behavior under combat conditions, determining the degree of influence of modern means of armed conflict on peoples' psyche, and the prevention and treatment of psychological trauma among combatants.

Serious psychological disorders, as a reaction to combat conditions, were a source of major manpower losses in the Israeli Army during the 1973 Arab-Israeli War and during the 1982 intervention in Lebanon. The relationship of psycho-casualities to the number of wounded, according to the U.S. journal MILITARY REVIEW, was approximately 30 per hundred and 23 per hundred respectively. In both wars, combat stress (a condition of individual pressure of tension arising from participation in combat) reduced combat effectiveness and contributed to the spread of psychic trauma. The illness in the majority of cases was characterized by a condition of deep depression, loss of space and time orientation, sharply pronounced reticence, or the opposite, an aggressiveness and irrational behavior. Many of the sick had characteristic hostility, feelings of fear, and alienation.

During the 1982 war, the Israelis derived tests for stress level for combatants and demonstrated its relationship to physical and psychological losses. The level was determined using the following data: training for battle, type of combat operations (factors of surprise, air attack, artillery fire, mine fields, etc.), combat and rear security and enemy opposition, the degree of trust in their superior commanders (unsubstantiated stress, weak stress, adequate support). For the research, four battalions (two infantry and two tank) were selected. Psychological officers, serving in the Israeli Army, studied reports of the battalions on the conduct of their own combat activities and ranked them in accordance with stress level during battle conditions.

According to announcements in the foreign press, the analysis showed that with respect to the level of combat stress, the battalions were ranked in the same order as the number of physical losses (the number of killed and wounded), psycho-casualities and in relation of psycho-casualties and physical casualties (see table). Consequently, the battalions, in which the stress level was the highest had a greatest number of physical casualties, psychic trauma and a higher level of correlation between psychocasualties and physical losses.

DEPENDENCE OF CORRELATION OF PHYSICAL AND PSYCHIC CASUALITIES ON COMBAT STRESS LEVEL

BATTALION	PSYCHO-CASUALITIES	PHYSICAL LOSSES (killed/wounded)	RELATIONSHIP OF PSYCHIC & PHYSICAL CASUALITIES
1st	31	36	86:100
2nd	9	23	39:100
3rd	1	10	10:100
4th	0	12	0:100

The last index for the 1st Battalion, finding itself in very complex conditions, was the greatest (86:100). This was a tank battalion which moved at great speed at night along a narrow valley, bounded by high hills. Here it was ambushed by enemy regular troops, supported by tanks and anti-tank weapons. The locale was mined. The Israeli battalion was subjected to heavy fire and could not execute its maneuver mission due to on-scene conditions.

In contrast to this unit, another battalion, with the least amount of combat-induced stress, with the lowest physical casualties, had a relationship of psychic casualties to physical of 0:100. Thus, the number of psycho-casualties was determined by the varying intensities characterizing the tension of the battle and the relative combat stress. So, the number of psychic traumas was greater in the mountains and in cities (which were in particular theaters of combat in Lebanon), where complex conditions caused greater loads on the combatants.

In addition to the intensity of combat action and battle stress, factors such as personal routine and life in the military environment had an influence on

the number of psycho-casualties in the Israeli Army. Soldiers from units with good leadership, a high level of cohesion, and with normal situations in their personal and family lives were, to a lesser degree, subject to psychic disorders. The tank crews, whose members were very close to each other and who studied together performed more effectively and with fewer psycho-losses.

Soldiers were subjected to greater psychic disorders if they were involved to a lesser degree in mental work, or if they had weakly developed motivation or a low training level. Selected subunits (with a high level of intellect and combat training, well-disciplined and with a moral spirit) had relatively fewer psycho-casualties, despite the fierce fighting and a larger number of killed and wounded.

In the course of the Lebanese war, Israeli psychologists researched as well the problem of the relationship of various components of the ethical spirit of combatants. The following were extracted from among those components: confidence in their commander, trust in themselves, understanding the character of the war, faith in one's weapons, reliance on one's comrades, and cohesion of unit personnel. It was established that trust in one's weapons became more and more the most important factor of the politico-ethical condition of the individual soldier over the last three decades. Psychologists are of the opinion that when faith in the justice of a war falls, which occurred, for example, during the war in Lebanon, the level of moral spirit can remain very high, if soldiers retain faith in their commander.

Research, was conducted among personnel of 30 platoons to further refine the contention of faith in command, which is based on three components: professional competence of the commander, his success as a person, and his concern for his men. These components are considered the most important essential parts of faith in the commander in daily life. It is made clear in combat that combat ability, to a very large degree, depends on professional competence, faith in which becomes the primary indicator of trust in the commander.

In the 1973 war, the majority of combatants with combat-induced psychic traumas were evacuated to the rear for treatment. Practically speaking, none of them ever returned to the front, many were discharged from combat units, and more frequently, from the armed forces.

Considering the experience of this war, Israel began to apply widely the practice of preventive "hardening of resistance" of the psyches of combatants, having designed special methods for this and having equipped training fields and ranges for it. Psychologists consider that the firing ranges must have "gloomy, dismal surroundings," in order to excite the "agressive instincts" of officers and soldiers.

In an Israeli Army psychological training manual, one of the training fields is described in this fashion: "A village, or rather, in its ruins, all around lie the dead bodies of "the killed" and a nauseating smell pervades. Among the splintered fragments of furniture is seen a child's doll, with a leg torn off. A woman's stocking dangles in a window frame. Everywhere, broken dishes. On the threshold of a demolished house lies the "corpse" of the mistress of the

house with its broken body thickly covered with flies. The legs of the husband stick out from under the debris. All of this is supplemented with the stench of a fire, simulated with the help of smoke granades."

Simultaneously, the Israelis adapted, for their armed forces, the U.S. system of immediate quick treatment of wounded at the front. As a result, 60 per cent of the soldiers and officers subjected to psychological shock in the course of battle, returned to their units within 72 hours.

Treatment began immediately, with the redeployment of troops by forces of special brigades, made up of respective specialists. It pursued the objective, to return a certain number of servicemen immediately to their units, through use of short term intensive psychoneurological aid (including physical therapy, shower baths, improved nourishment, sleep, and an interview with a psychologist). Those who did not respond to this rapid treatment were evacuated to specialized combat medical units in the nearest part of the rear (a second echelon of neurological aid).

For this short term therapy they created cadres of "psychological health," attached to medical battalions. They worked 2-5 km from the front. Each group consisted of 5 people: a psychiatrist, 1-2 psychologists, and 2-3 sociologists. One of the most successful of the groups was able to carry out treatment and return to duty 95 per cent of the personnel formerly showing signs of psychic disorders.

The massive ideological processing accomplished by the Israeli command and the psychological training of personnel, the measures undertaken for prevention and cure of psychic trauma, and the sociological research carried out--all these measures were imbued with a spirit of zionism, racism, militarism and anticommunism. They are in pursuit of the goal of converting the Israeli armed forces into an obedient arm of the aggressive, expansionist course of the Tel Aviv leadership, which is the basic conductor of a policy of international imperialism, especially the American policy, in the Middle East.

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BRITISH ARMORED DIVISION IN PRINCIPAL KINDS OF COMBAT

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 9, Sep 86 (Signed to press 10 Sep 86) pp 15-20

[Article by Lt Col S. Anzherskiy; "The British Armored Division in the Principal Kinds of Combat"]

[Text] In organizing the British Army, which is done in accordance with military doctrine and with NATO's program of developing its armed forces in mind, the main attention is paid to raising their combat and mobilization readiness, improving the organizational structure, strengthening firing and striking power of units and organizations by equipping them with modern weapons and combat equipment, and developing new combat capabilities, using both nuclear and conventional fires.

As reports in the foreign military press show, in the British regular forces (more than 160,000 personnel) there are three armored divisions (1st, 3rd, and 4th belong to the 1st Corps in the FRG) and one motorized infantry (2nd) division (located in Britain and designated to reinforce 1st Corps), 15 detached brigades, including artillery (1) and airborne, as well as detached units and subunits of combat and rear support.

In the British leadership's view, the armored division (about 16,000 personnel) is considered the principal army formation, capable of conducting combat operations both as a part of a corps and independently. It has a headquarters, three brigade headquarters, five tank regiments, five motorized infantry battalions, three artillery regiments (two 155-mm self-propelled howitzers and one 105-mm self-propelled cannon), and army aviation, signal, engineers, transportation regiments, quartermaster, ordnance and medical battalions, a company of military police and other combat and support subunits (Fig. 1). It is equipped with 325 CHALLENGER and CHIEFTAN tanks, and light recon vehicles named SCORPION, 48 self-propelled 155-mm M109A2 howitzers, 24 ABBOT self-propelled 105-mm cannons, 40 81-mm mortars, 30 STRIKER self-propelled launchers with SWINGFIRE ATGM, 120 MILAN ATGM launchers, 36 LYNX and GAZELLE helicopters, BLOWPIPE portable air defense missiles, 84-mm Carl Gustav anti-tank grenade launchers, 7.62-mm grenade launchers and automatic rifles, approximately 2,000 armored personnel carriers and vehicles of various types and also other armament.(2)

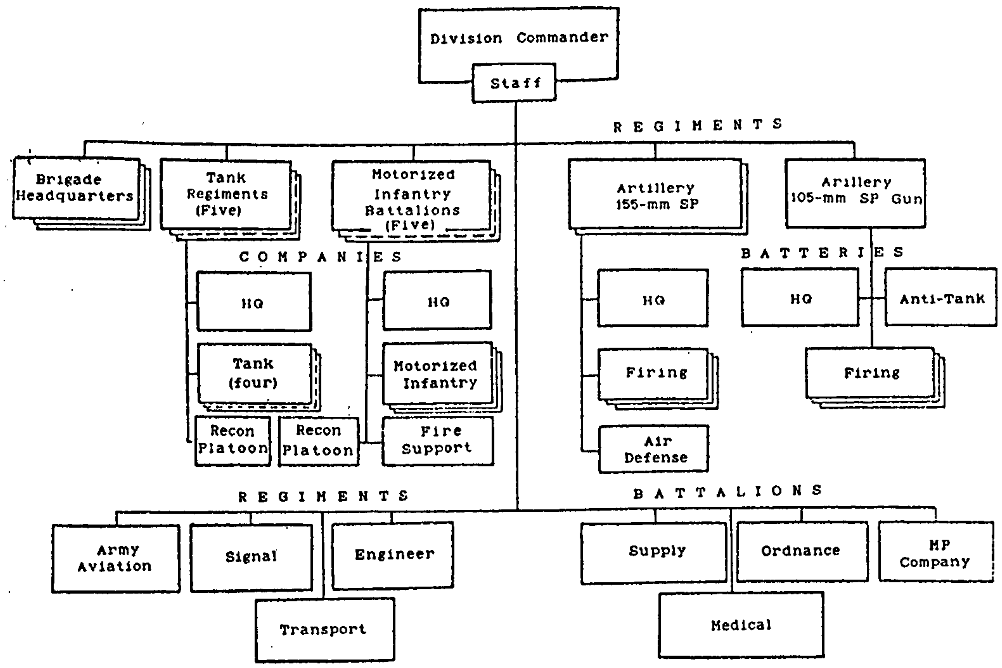


Figure 1. British Armored Divison Organization

As the foreign press reports, armored division brigades do not have a fixed organization (they are constituted during battle or training). It is determined by the mission, division organization, the situation and the terrain. As a rule, each brigade can include one or two tank regiments, two or three infantry battalions, an artillery regiment, and support organizations. In battle it is organized into combat teams, the foundation of which are the tank regiments or infantry battalions with attachments.

The foreign press notes that one of the brigades of the 3rd Armored Divison (specifically, the 6th) is planned to be used as an airmobile antitank reserve of the 1st Corps. Exercise experience indicates that it includes two motorized infantry battalions reinforced with artillery and ATGMs. CHINOOK and PUMA helicopters (about 30) were used to transport it to the threatened area.

THE OFFENSIVE is regarded by English commanders as the principal form of combat activity which permits attainment of decisive goals in battle and operations. Its success is achieved by successfully engaging the enemy throughout the depth of his formation. It may be accomplished with the use of nuclear weapons or just conventional munitions with great accuracy. It is believed that forces will transition to the offense from the move when leaving areas of concentration or from direct enemy opposition.

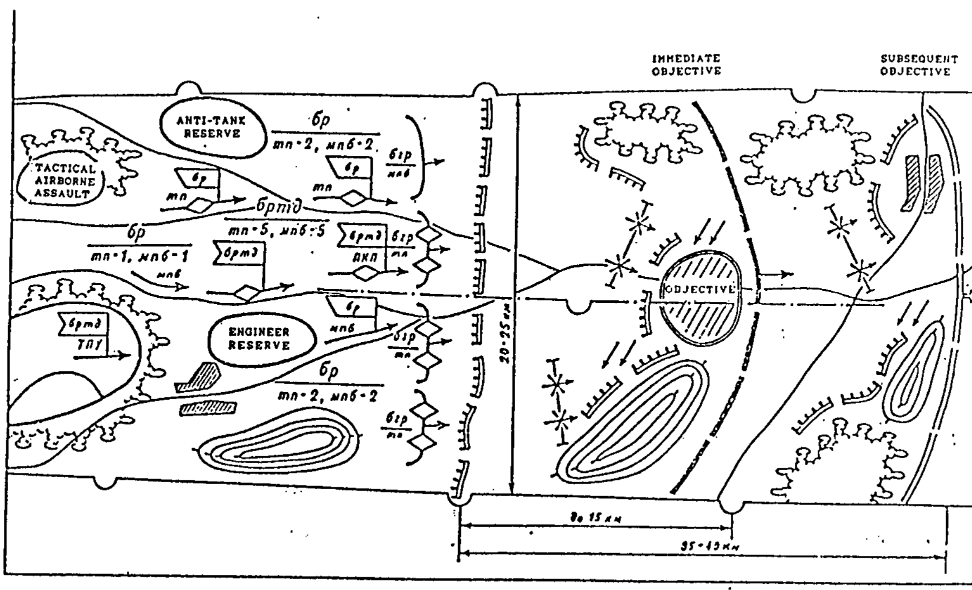
The principal forms of offensive maneuver, in Western specialists' opinion, are the penetration, frontal attack, envelopment (vertical envelopment using airmobile subunits), and turning movement, and combinations of these.

The armored division, judging by the foreign press, operates, as a rule, as an element of a corps, in its first or second echelon. As a part of the first echelon it may participate in the main attack with the mission of penetrating the enemy defense and supporting the attack of corps main attack. A second echelon division exploits the success of the attack.

In battle, the armored division is normally reinforced by a variety of resources, the amount of which depends on the division's place in the corps operational structure, the concept of the operation, the mission, and the nature of the enemy defense and the terrain in the attack area.

The division's mission is divided into immediate and subsequent. For a first echelon division the immediate objective will involve penetration of the main defensive position and occupation of objectives to a depth of 15 km, and the subsequent, carrying the attack to a depth of 35-40km and further. The width of an attack zone is determined by considering the above mentioned factors. As noted in the English press, a division in the main attack may be assigned a zone with a width fo 20-25 km.

The combat structure of units and subunits should be developed considering the potential of employing both nuclear and conventional munitions, facilitating wide maneuver to concentrate forces for a pentration and quick dispersion for defense against weapons of mass destruction. As a rule, this will be a one echelon formation with a brigade in reserve (Fig. 2).



бр	Brigade	бртд	Armored Division
бр	Brigade CP	бртд	Armored Division CP
тп	Tank Regiment	бртд ПКП	Armored Division Forward CP
мпб	Infantry Battalion		
бгр	Battle Group	бртд ТПУ	Armored Division Rear CP

Figure 2. An Armored Division Attack Formation (Example)

It is believed that, under modern battlefield conditions, divisions will enter the attack from the move. Under these conditions it is envisioned that its units and subunits will leave assembly areas located 40-50 km from the enemy's forward defenses, in dispersed approach march formation along preselected routes, preferably at night or under conditions of reduced visibility.

Preparatory fires before an attack serve not only to destroy the enemy's main defenses located along the forward edge of his defenses and deeper, but also to secure the maneuver of the divisional units in creating strike groups at selected locations. Tactical and Army air strike objectives not engaged by artillery (especially where the main forces are concentrated), and to prevent the enemy from regrouping and from moving his reserves forward. Upon completion of artillery and air preparation, divisional units and subunits begin the attack and supporting fires shift to the rear and flanks to hit targets which are obstacles to the leading formations.

To maintain a rapid attack tempo it is recommended to use breaches which occur in the defense and gaps between strong points. If the defense is suppressed then the subunits quickly advance on tanks and personnel carriers, or, in the face of strong opposition, the personnel of the motorized infantry subunits dismount and seize attack objectives with the support of army air, tanks, and others.

Strongly fortified areas are usually bypassed, and when this is not possible, they are attacked following artillery and air strikes.

Enemy counterattacks should be repelled, depending on their size, by attacks of the first echelon from the move, and when necessary, by the second echelon (reserve).

It is considered advisable to commit the division reserves upon seizing the immediate objective to exploit success or to replace subunits which have suffered heavy losses.

The division commander may employ an air assault with a motorized infantry company or battalion in order to increase the tempo of the attack. The mission of an air assault under such circumstances will be to seize and hold tactically important terrain or objectives to support the forward movement of divisional tank formations.

Upon reaching the attack objectives, the first echelon units and subunits should maintain contact with the enemy or dig in on the objective.

DEFENSE, judging by the foreign military press, is a necessary form of combat activity, which forces employ temporarily to repulse the attack of a superior enemy force, hold an important region, inflict maximum losses upon him, and to transition to the offensive. The defense may be entered deliberately or hastily, in advance or hurriedly, under direct contact with the enemy or no contact.

Army leaders suggest that the defense should be active, resolute, in depth, anti-armor, capable of withstanding nuclear strikes and other weapons of mass

destruction. Depending on the composition of the defending force, the fortification of the area, and the method of conducting the defensive battle, defenses are categorized as mobile or positional.

MOBILE DEFENSE is based on use of a strong reserve which may include up to two-thirds of the forces, nuclear weapons, or on conducting decisive counterattacks and counterstrikes. Mobile defense is conducted by a defense-offense method in which the main emphasis is placed not on holding a specific objective or area, but on the destruction of the main forces of the attacking enemy in the depth of the defense by nuclear strikes and counterattacks by divisions and units in coordination with tactical and army air to create favorable conditions for transitioning to the offense.

POSITIONAL DEFENSE is employed to hold an objective or terrain by inflicting maxiumum losses on an attacking enemy forward of the FEBA. For this it is recommended to have not less than two-thirds of the forces in the first echelon. The main mission of the defending forces is the firm holding of the main line of defense. It is believed that positional defense is most effective under conditions in which only conventional munitions are employed.

An armored division on the defense may be located in the first or second echelon of a corps (Fig. 5). Depending on the specific situation, it may conduct a mobile or positional defense or a combination. Selection is made based on the mission, availability of forces and weapons, the terrain and nature of enemy activity.

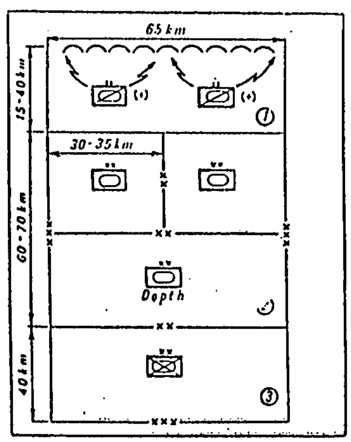


Figure 5. An Armored Division as a Component of a Corps in the Defense (example).

1. Security zone (two reinforced cavalry regiments);
2. Main defensive zone (three armored division);
3. Rear area (motorized rifle division).

Mobile defense is recommended when the mission and the local terrain allow organization and conduct of defense in depth, and the area favors relatively free maneuver of forces.

A division's positional defense is based on a firm defense of a well-fortified position and placement of the principal forces and weapons (two brigades or more) in the first echelon. The second echelon (up to a brigade) is established to add depth to the defense, block penetrating enemy forces, destroy them and conduct the counterattack. An armored division may be assigned a zone with a width fo 30-33 km and a depth of up to 30 km. A brigade zone would be, correspondingly, 10-15 km and up to 10 km.

The defense is organized into main and rear areas of defense, and when going into the defense while not in contact with the enemy, a security zone. In the main defensive area (with a depth of 10-15 km) are located the main divisional forces, forward and main command posts, as well as attached and supporting forces. The division rear area (with a depth of 10-15 km) is behind the main defensive area. In it are the main and reserve forces of the division second echelon, blocking positions, and counterattack routes. Also located here are the rear CP and division rear.

The combat formation of an armored division in defense is usually one or two echelons depending on the form of defense as well as the role of the division in the corps structure, the terrain, conditions of going into the defense, and the mission (Fig. 6). For conduct of a mobile defense the formation may contain two echelons. A positional defense may be a single echelon with a separate reserve or two echelons.

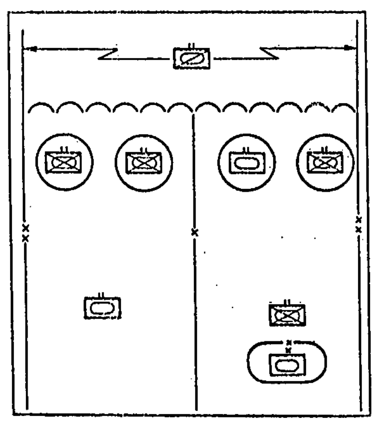


Figure 6. Armored division in the defense formation (example).

In the first echelon are two brigades (each has one tank regiment and two motorized infantry battalions) and in reserve one (with the mission of counterattacking).

In a mobile defense, upon the enemy's approach to the forward area of the defense which contains strong points or areas, a series of delaying actions are conducted in such a manner as to force the enemy's advance to follow avenues into preselected killing zones. Upon penetration of the enemy into the depth of the defense, the units of the first echelon are directed to prevent their further advance, to stop and force a regrouping of forces (Fig. 7). Then a counterattack by the second echelon of the division of corps defeats the enemy with the goal of restoring the lost position.

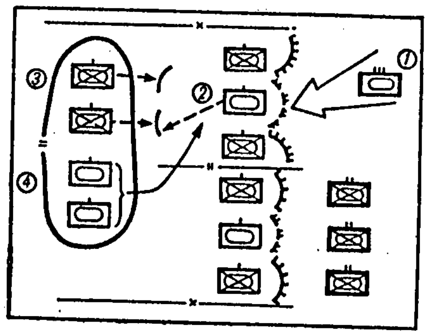


Figure 7. Conduct of a mobile defense by a tank brigade (example).

1. Enemy attack route;
2. Withdrawal of a tank company to a new position;
3 & 4. Destruction of the penetrating enemy.

In positional defense, the battle is initiated by covering forces, which delay and cause the attacking enemy to deploy prematurely to combat formations, inflict maximum losses on him, attempt to halt his advance, and deceive him as to the true location of the forward edge of the defense.

Upon the advance of the enemy directly to the forward edge of the defense, the battalions of the first echelon brigade (Fig. 8), employing all available forces and weapons, attempt to disrupt or weaken his advance. Upon penetration by the enemy into the area of the battalions of a first echelon brigade and the threat of penetration of the main area of defense, a counterattack is conducted to restore the former position. In the case where the enemy has penetrated with strong forces to the rear of the division defense and the division cannot restore the position with its own forces, it is given the mission to prevent the enemy's further advance, and support the counterattack conducted by the corps second echelon.

A RETROGRADE, as defined by English specialists, is considered a form of combat which removes forces from direct contact with the enemy to a position

in the rear or another area. An armored division may accomplish a withdrawal, as a rule, by echelon, covered by part of the force, preferably by tank battalions. Withdrawing units are given a time, order, route of withdrawal and assembly area or new position on which to defend. A withdrawal may be conducted in steps using several intermediate positions on the way to the

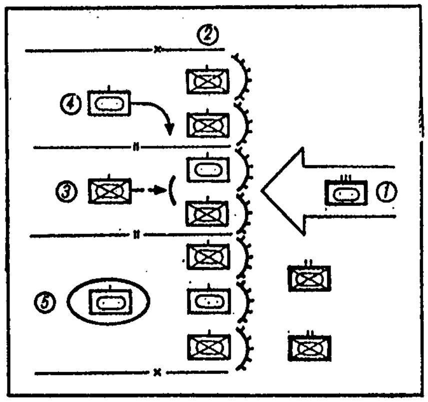


Figure 8. Conduct of a Positional Defense by a Tank Brigade (example).

1. Enemy attack route;
2. Position of tank and infantry companies;
3. & 4. Second echelon forces;
5. Brigade reserve (tank companies).

ultimate defensive position. It should be conducted during darkness or reduced visibility and to prevent the enemy from discovering the true intention by conducting deception, usually portraying normal activities, and by heavy artillery fires and radio electronic combat.

1. According to Western press data, the artillery brigade was formed from the disbanded artillery division. Ed.

2. For details concerning the organization of armored units and subunits, see ZARUBEZHNOYE VOYENNOYE OBOZRENIYE, 1985, No. 10, pp 31-32. Ed.

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ARMORED VEHICLE FIRE EXTINGUISHERS

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 9, Sep 86 (Signed to press 10 Sep 86) pp 23-26

[Article by Maj S. Shevaldin; "Armored Vehicle Fire Extinguishers"]

[Text] In the overall system of militaristic preparation which is carried out in the U.S. and other capitalistic countries, much attention is paid to improving tanks, infantry fighting vehicles, armored personnel carriers, and other armored vehicles. One of the trends in this development is increasing the capability to withstand various types of damage. Since, as foreign military specialists believe, modern antitank weapons, especially ATGMs, can defeat armor, it is very important that armor should not be toally destroyed and that the crews not be killed.

Combat experience with various types of armored vehicles, especially tanks, shows that, in cases where armor has been hit, the greatest damage to the vehicle and the crew has occured from the outbreak of fire and the subsequent explosion. It has been reported in the Western press that during the Second World War, on average, four out of ten tanks that were hit burned. During the aggressive wars by the U.S. in Viet Nam and Israel in the Middle East, this statistic rose to 50 per cent of the total number of tanks killed. For example, in the 1973 Arab-Israeli War, in 10 days of battles the Israeli Army lost about 700 tanks to burning.

The high danger of fire in armored vehicles is explained in particular by the fact that the interior space is filled with a lot of fuel, oil, and other operating materials. Therefore, with the goal of reducing the tendency to burn in military vehicles, in addition to replacing gasoline engines with diesel, fuel and oil tanks were isolated from crew space by a firewall.

One of the principal causes of death in tank crews, besides fires in the tank, is explosion of the ammunition which occurs after a shaped charge jet or fragments of armor and shells enter the ammunition compartment. Therefore steps are being taken to suppress fires.

In the postwar years, the effectiveness of various kinds of antitank weapons improved, which increased the vulnerability of combat vehicles. At the same time, attempts to increase the combat load and the mobility (in particular,

the supply of fuel), resulting in increases in the volume occupied by ammunition and fuel in the vehicle, necessitates locating those in vulnerable sections of the armored space. All of this, in foreign specialists' opinion, makes it necessary to develop highly effective fire extinguishing systems for armored vehicles.

As noted in the foreign press, such systems should improve the survivability of the crew (without heavy skin burns, shock wave damage, smoke inhalation), as well as fire suppression in uninhabited areas of the vehicle to keep it operational or repairable. Additionally, the following requirements were given: low false-alarm rate, high reliability, reusable, activated both from the inside and outside of the machine without activation of the main electrical system, on the move or at halt, with the engine running or off.

At the present time, in foreign countries, three fire extinguisher systems have achieved the widest acceptance. They are manufactured by Graviner (Britain) and Doigra (a subsidiary of the aforementioned English firm in the FRG), Hughes (U.S.), and Spectronics (Israel). The first of these is produced for English and West German tanks (Fig. 1), the second for the American M1 ABRAMS, and the third for Israeli tanks, principally the MERKAVA.

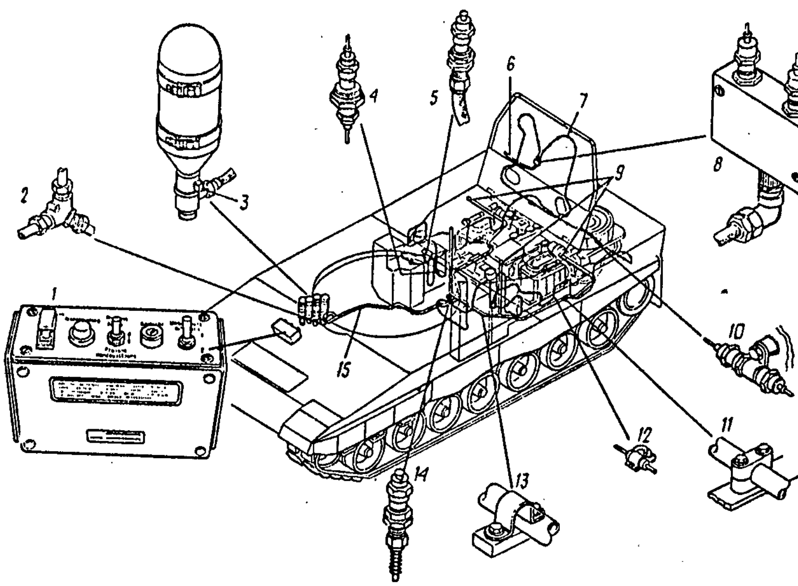

Figure 1. Elements of the Fire Extinguishing System of the West German LEOPARD-2 tank.

1. Control system; 2. Valve; 3. Fire extinguisher cartridge; 4. & 14. Diaphragm connecting devices; 5. Diaphragm connecting device with flexible tubing; 6. Connecting tubing; 7. Temperature sensing coaxial cable; 8. Connecting box; 9. Sprayers; 10 & 12. Thermosensing cable mounts; 11. & 13. Mounts for tubes for transmission of fire extinguishing material to sprayers; 15. Tubes for transmitting fire extinguishing material.

These systems have common technical characteristics, however they also have significant differences. Each system consists of two subsystems; defense against fire and explosion of the crew compartment and other spaces. The basic elements of both systems are the sensor and computer system and the control and extinguisher system (fire-extinguishing material and equipment to direct it onto the fire), and the necessary communications.

By the middle 70s, automatic subsystems for defense of the non-crew spaces were widely accepted in capitalist countries. Manual extinguishers or systems were used on crew spaces.

For detecting locations of fires in non-crew spaces, a series of heat sensors is used which detect increases in temperature and transmit a signal to the control system which opens a tank of fire-extinguishing material. Recently these sensors have been made from thermosensing coaxial cables with a diameter of about 2 mm with a dielectric between the exterior and the internal wire. This cable is quickly installed, operates quickly and provides reliable protection against false alarms. To raise the effectiveness of the fire-extinguishing material, use is being made of halogen, specifically, halon (1), instead of carbon dioxide (CO_2). It is noted that halon is a powerful flash extinguishing substance, but it excretes toxic fumes.

After the Arab-Israeli War of 1973, work in perfecting fire protection systems for the crew spaces increased sharply abroad. Much research conducted by foreign specialists showed that they should be very fast acting and sensitive. It is believed that improving the survivability of the crew without drastic consequences is possible only when the location of a fire is detected within 2-5 msec, if effective fire extinguishing material is delivered on it quickly, and if it is fully suppressed in 60-150 msec.

The progress of a fire and explosion depends on the character of ignition of the vehicle, its components, the type of shell fragments which have penetrated the armor, and many other causes. When incendiary agents, especially shaped charge jets, enter the fuel tanks or lines, fuel is dispersed and the vehicle fills with the dangerous vapors from which a flash fire can easily ignite. As a result, the pressure and temperature increase, which can cause the death of the crew. Upon detonation of fuel vapors in the combat compartment over a period of 140-240 msec the pressure increases to 3.5 to 14 atmospheres, and the intensity of the heat radiation may reach 6-10 watts/cm^2 over 100 msec, resulting in second degree burns.

Further flowing of fuel from the tanks and spreading of the flames leads to fire. In this connection, foreign specialists emphasize that if the process is not ended in its earliest stages, the crew cannot escape annihilation. If the fire is totally eliminated in the proper time, pressure in the vehicle will increase only to acceptable levels, heat will not cause serious injuries in the crew compartment, and the depletion of oxygen will be insignificant.

Since the quickest way to detect fires is optically, modern systems employ infrared sensors.

The principal functional detection subsystem made by Graviner, for protecting the crew compartment, includes three sensing elements (narrowband IR sensors), each of which works in a different wavelength; 4.4, 0.96, and 0.76 microns. The first is characteristic of hydrocarbon flames upon the formation of radical CO_2. Because of its established threshold and the measuring of the increase in the light intensity, this sensor will detect ignition of fuel but will not react to light with shorter wave lengths. However, it will detect light from other sources (from the flash of firing, for example). Therefore, to eliminate the possibility of false activation of the system, it includes additional sensors and a logic system.

In the fire-extinguisher system from the American firm Hughes, a two-spectrum sensor is used. Long wave lengths of 0.8-1.0 microns (near infrared regime) were selected and 7.0-30 microns (far). According to statements of the firm's specialists, analysis and experimentation show that these spectral fields are observed in fires or explosions in hydrocarbon matter but very rarely are observed in other situations. In the 7.0-30 micron regime it is far easier to obtain a favorable signal-to-noise ratio than in the 2-6 micron range. The sensor sends a signal to the system only if it detects infrared radiation in both bands at a level which exeeds the established thresholds. To make the sensor insensitive to shaped charge jets (penetrating the vehicle but not igniting a fire), it is given three IR sensing devices which feed information to the control center.

Two-color IR sensors are used also in the Israeli fire-extinguisher system for the fighting compartment. It is reported in the foreign press that such systems can detect fires of even very small dimensions (13 cm diameter) at distances of 1.2 m from the sensor.

In all of the above fire-extinguishing systems, signals from the sensors are sent to a control center in which this information is processed. On the basis of the data, a command is formulated to place extinguishing material on the fire from the appropriate tank. Control centers are made up of microprocessors. In addition to processing information about fires, the control center may be given the mission of controlling the condition of the fire-extinguishing material in the tanks. Also, to it may be attached a device to stabilize the system voltage and protect it from peak loads, provide reserve electrical power, control regulation of networks of sensors and fire alarms, remote switching of sprayers, and control of the entire system.

A peculiarity of the Graviner and Spectronics control centers is a setting for peacetime and combat. In the first case the system is tuned to put out accidental fires, the possibility of which always exists, and the second for suppressing fires and explosions of fuel caused by combat damage.

The foreign systems described use as a fire-extinguishing material liquified halon 1301 (carbon, bromine, fluorine). Foreign specialists explain that the advantages of this over carbon dioxide are due to many reasons. First, suppression of the fire does not occur through denial of oxygen (as it does with CO_2), but through indirect chemical action on the source of the fire. Halon 1301 disrupts the chain reaction preventing explosion of the hydrocarbons. Therefore the fire's progress is interupted very quickly even

with small concentrations of halon. The American standard NFPA-12 of the Association for Fire Protection shows that putting out the majority of fires in hydrocarbon matter only requires fire extinguishing material slightly in excess of 6 per cent (for comparison, extinguishing a fire using carbon dioxide requires it to reach about 40 per cent). In accordance with the same standard, humans should be present in air containing 7 per cent halon for not more than 5 minutes. In putting out fires in the fighting compartment the systems described create concentrations of 6-9 per cent.

Considered important arguments favoring halon 1301 are the possibility to prevent the charring of electrical contacts and burning of insulation on wires causing short circuits, maintaining inert gases and the absence of foam, water, dust and other remnants after extinguishing a fire, which prevents the fire from restarting and reduces the requirement to clean the vehicle of secondary material. Also, as emphasized by foreign specialists, the harmful effect of this material on human bodies cannot be ignored. However, they believe that this is minor compared with the possibility of perishing in a fire or explosion.

Halon 1301, under high pressure, is located in steel tanks along with an inert gas (as a rule, this is dry nitrogen). Their volume, number and placement are determined by the design of the vehicle. Each tank is equipped with a valve device which seals it and permits rapid dispersion of the extinguishing material onto the fire upon the command of the control center.

The principal demands placed on the valve device are rapid action and reliability. It is belived that the time to open the valve should not exceed 10 msec, while the opening must be sufficiently large to ensure the rapid dousing of the fire. The systems made by Spectronics and Graviner use pyrotechnic actuators, but the American system uses an electromagnetic one. The latter, in Western specialists' opinion, can provide more rapid action but it is harder to achieve a reliable seal. Also, electromagnetic activation requires high power (18 amps compared to 5 amps for a pyrotechnic valve.) The speed with which extinguishing material can be placed on the fire is substantially influenced by the deficiency of tubes in the crew compartment.

In the subsystems for protecting crews of the systems presented, rapid action is achieved by reducing the time for conducting the whole operation. Together with using active extinguishing material this ensures their effectiveness. Thus, judging by materials in the foreign press, during the Israeli aggression in Lebanon in the summer of 1982, not one crew of a MERKAVA tank equipped with a Spectronics system perished, although there were six cases of minor fires in these tanks. At the same time, 25 percent of the overall losses in crews of M60 and CENTURION tanks with older systems were found to be caused by fires.

An important achievement of the modern fire protection systems, in foreign specialists' opinion, is their relatively low cost (less than 1 percent of the cost of the vehicle).

Equipping armored combat vehicles with modern, effective fire protection systems is viewed abroad as one of the most important ways to raise their survivability, that is, the ability to maintain combat readiness in battle.

1. In the foreign press, it is also called freon.

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DEVELOPING RECONNAISSANCE AIRCRAFT TACTICS TO COUNTER AIR DEFENSE

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 9, Sep 86 (Signed to press 10 Sep 86) pp 29-35

[Article by Col A. Krasnov; "Developing Reconnaissance Aircraft Tactics to Counter Air Defense"]

[Text] During the militaristic preparations, the U.S. and their aggressive NATO bloc allies are attempting to significantly increase the aerial reconnaissance capabilities, along with building up the strike power of their air forces, considering it one of the most important types of support for the combat operations of the armed forces. As a result, simultaneously with improving its systems, a great deal of attention is being paid to the development of reconnaissance aviation tactics, especially its aspects of countering enemy air defenses (PVO).

The overcoming of PVO by reconnaissance aircraft crews, according to Western military specialists, is the decisive factor which determines the conditions, capabilities and results of executing aerial reconnaissance missions. In analyzing reconnaissance aviation tactics in the past and present, they emphasize that the continuous search for and the improvement of tactical methods has accompanied its development. It has more actively occurred during wartime, when reconnaissance was conducted under conditions of actual PVO opposition.

In particular, the foreign press noted that the Second World War served as a stimulus for the development of aerial reconnaissance tactics. In comparison with the prewar years, it is rich with a whole set of new methods, allowing aerial reconnaissance pilots to achieve secrecy and operational surprise, to successfully maneuver in the antiaircraft fire envelope and to escape from enemy fighter pursuit. Having begun with such tactical methods as the turn into the target in a glide with the engines at idle in order to remain undetectable by ground acoustic detection systems, and use of the sun, cloudcover or the horizon's dark side for masking, by the end of the war the reconnaissance aircraft crews executed their missions at a wide range of altitudes and according to the principle of force (they were protected by fighters), mastered avoidance and deception maneuvers, more deeply used the natural weather conditions for camouflage and very successfully conducted reconnaissance amidst strong PVO system opposition.

In the tactics of reconnaissance aircraft crews, executing missions in the enemy's deep rear, the actions at medium and high altitude prevailed, since it was difficult to detect them with the technical systems existing then, and to intercept them with fighters. In addition, the antiaircraft artillery (ZA) fire was ineffective at these altitudes, and the crews were able to photograph large area targets practically without interference.

In the first postwar years, the PVO systems of many countries were qualitatively changed. The extensive introduction of new systems, especially radar and jet fighters, allowed great leaps in their development to occur. By using radar, the enemy could detect reconnaissance aircraft ahead of time in any weather, day and night. This provided the capability to make timely decisions on the use of active air defense systems, the effectiveness of which increased immeasurably.

Nevertheless, at first, in many capitalist countries, the air force commands, organizing aerial reconnaissance, did not evaluate the importance of this leap in PVO development, and sometimes the traditions of the war years prevailed in reconnaissance aviation tactics. Reconnaissance aircraft, as before, tried to operate at the highest altitudes possible. For example, in the U.S.'s aggressive war in Korea (1950-1953), in connection with the advent in KPDR (North Korean) PVO of jet fighters and the sharp increase in the number and quality of air degense systems, American reconnaissance aircraft executed flights at altitudes not less then 7,000-8,000 m.

Military theorists of the U.S. and several other capitalistic countries, predicted a further increase in the flight altitude for aerial reconnaissance, based on this experience. But in their forecasts, there was not even one mention of the basic renewal of tactics, continuously connected to air defense system developments. However, experience has shown, that not even the highest altitude saves a reconnaissance aircraft from continous radar tracking, the firing of antiaircraft guided missiles (ZUR) and the attack of high-altitude fighter-interceptors. Therefore, the use of traditional tactics in later military conflicts resulted in large losses and even the complete inability of aircraft to penetrate to the reconnaissance targets, which called for new tactical methods. At the same time, this was evident not only with reconnaissance aircraft, but with military aircraft in general.

In taking up this issue, the foreign press noted, that in a period when these changes were still hidden in the potential capabilities of aviation equipment and tactics, Western experts put forth many absurd suggestions for reducing the role of aerial reconnaissance and aviation in general because of the inability to overcome air defenses. The issue of eliminating reconnaissance aviation all together was even put forth.

In the further search for ways to get away from the developing impasse, a break from existing tactical methods occurred. By the beginning of the 1960s, several new suggestions were already being worked out, in which, according to foreign specialits' opinions, the growing capabilities of jet reconnaissance aircraft and the continuity of combat experience were successfully united. Reconnaissance aircraft's main form of combat actions to break through air

defenses was the use of low and very low altitudes, since radar detection capabilites against aerial targets were limited and it was practically impossible to create a solid radar surveillance zone at these altitudes. In addition, there were limitations for air defense fighters, especially in their use of several types of missiles; because of the increased fuel expenditure, their combat radius and air alert time were reduced. Large angular velocities during the transition of reconnaissance aircraft to low altitudes during flight complicated the search and firing of air defense systems. A long time was spent in studying new tactics and accumulating experience in their use.

In studying the advantages of reconnaissance aircraft mentioned above, American specialists figure, that henceforth, it will be necessary to unconditionally stick to low altitudes, and their crew training was conducted based on these considerations. It was aimed at developing new piloting and aeronavigation techniques and tactical methods at low altitudes. However, the initial experience of conducting reconnaissance at low altitudes under combat conditions did not yield the desired results, but just the opposite. For example, during the Korean war, American reconnaissance aircraft attempted to conduct reconnaissance at low altitudes but, by operating at low speeds in a straight line without maneuver, they suffered heavy losses from small-calibre antiaircraft artillery, gun and rifle fire.

Additionally, the experience of executing long flights at low altitudes revealed other negative aspects, namely: the depth of conducting reconnaissance was sharply reduced; and serious difficulties arose in searching for and identifying targets due to an increase in flight speed. At the same time, although reconnaissance aviation already had jet aircraft, their main type of maneuver, as with piston aircraft, was a horizontal maneuver and the methods, highly popular earlier, for overcoming air defenses during the turn toward the reconnaissance target, based on sun and cloudcover masking, proved to be unsound when the enemy was using radar.

Consequently, a new stage in the search for more effective tactical methods began abroad. It was marked by the extensive use of a verticle maneuver along flight routes, and during the approach to the target, and later, by the development of various flight variants using a variable profile, calculated to achieve operational surprise and provide more time to observe the target.

As the foreign press noted, the combination of flights at high, low and very low altitudes (the variable profile, so to speak) with other tactical methods, and primarily using an antiaircraft gun maneuver, was characteristic for the aerial reconnaissance by American aircraft during the Vietnam War. U.S. Air Force experts thought that such maneuvers, within a radar's operational zone, not only reduced the reconnaissance aircraft's detection range, but also degraded the quality of information, and increased the error in determining their flight parameters, which in the end reduced the effectiveness of air defense operations.

After the advent of antiaircraft guided missiles, it became clear that the previous maneuvers used for evading antiaircraft artillery fire would not enable reconnaissance aircraft to successfully overcome the air defense system. The crews of American reconnaissance aircraft were afraid to operate

in zones where the presence of surface-to-air missile (SAM) complexes were surmised.

The first type of maneuver was the avoidance maneuver. The crews selected a flight route which bypassed the SAM position at a safe distance. However, due to the further increase in the number of SAMs and their protection of reconnaissance targets, this maneuver became practically useless and another was required which afforded the minimum effect by air defense systems during reconnaissance aircraft flights directly in the SAM's lethal envelope. Three types of antimissile maneuvers were worked out: during the approach to the SAM missile's surmised operational envelope, the aircraft descended for the approach beneath the SAM radar's lower detection limit, changed course with the aim of deceiving the enemy, or exited from the lethal envelope. In case a missile launch was detected, the aircraft maneuvered drastically in order to force it to deviate from the flight path because of large g-loads or with the goal of breaking the homing-seeker's lock-on (Fig. 1).

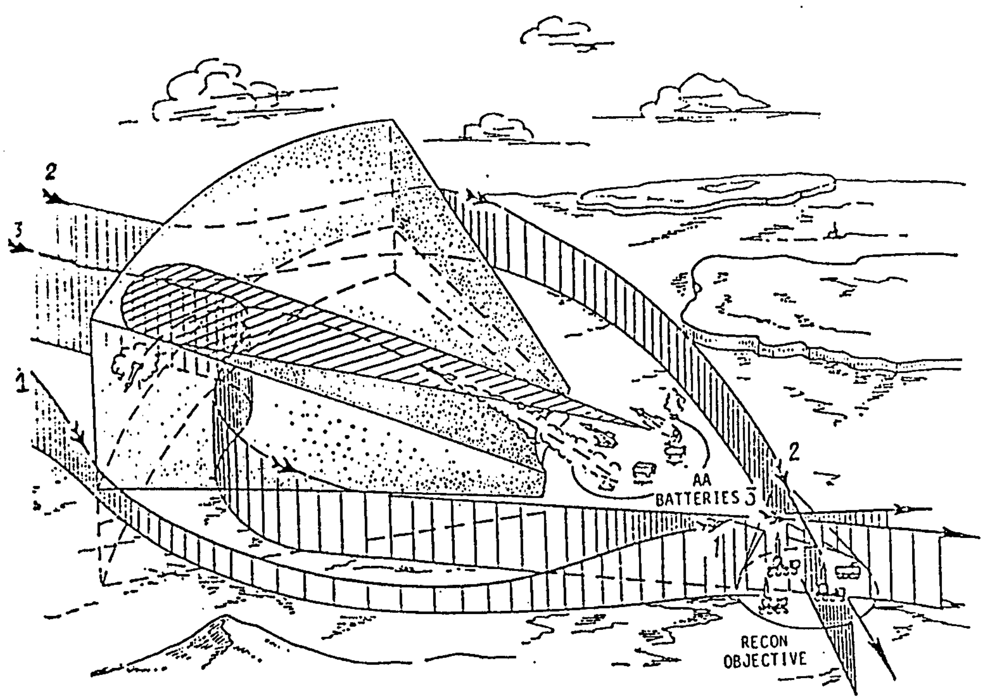

Figure 1. Reconnaissance Aircraft Anti-Missile Maneuvers

1. Dive to an altitude less than the lower limit of the SAM envelope;
2. Maneuver with a sharp course change;
3. Maneuver upon visual detection of a launch.

As the Western press noted, the effectiveness of using the first two methods depended on the crews' knowledge of the actual terrain, and the characteristics of the SAM's modes of operation. In particular, the absence of information or the accuracy in information resulted in large losses by the American Air Force in Vietnam.

Later, the development of the antimissile maneuver was tied into the development of onboard equipment for detecting the illumination of aircraft by air defense radar systems, determining when the missiles were launched, and also the direction and distance to them. In using this equipment, American pilots began to create a subsequent type of antimissile maneuver. Immediately upon being painted in the SAM radar's detection envelop, they began drastic maneuvers along an axis and at an altitude which complicated the radar's aiming. When a missile launch was detected (based on the radar being shifted to an automatic or visual target tracking mode), they sharply descended with a turn toward it or else departed into the sun.

Nevertheless, according to the U.S. Air Force command's declarations, of all the missions, completed by the Air Force in Southeast Asia, the most dangerous was aerial reconnaissance. For the first three years of the Vietnam War, reconnaissance aviation subunits suffered more losses than the subunits of other arms and the greatest losses occured on reconnaissance aircraft flights at medium, and also low altitudes. As a result, the trend was maintained in American aerial reconnaissance tactics toward operating at very high altitudes. The execution of this mission was entrusted to the specially created, so-called super-high altitude, subsonic U-2 aircraft. During flights at altitudes of 20,000-30,000 m, they were practically invulnerable to air defense systems existing at that time. Using this advantage, the Pentagon regularly dispatched such spy planes into the airspace of many sovereign countries in practically all regions of the world. However, due to the extent of the development of air defense systems, such flights became dangerous (one of these aircraft was shot down over USSR territory). After this, the tactics of high altitude reconnaissance aircraft were drasticly changed. They were equipped with various radiotechnical reconnaissance systems, by which the U-2 crews were able to conduct reconnaissance of contiguous countries without violating the border. At the same time, these aircraft continued to penetrate regularly the airspace of independet countries, expecially those with a weak air defense system, by operating from air bases located on the territory of U.S. allies. Simultaneously, flight tests were conducted with the goal of studying the capabilities of employing U-2 aircraft from aircraft carriers.

However, according to American military expert's views, these aircraft did not satisfy the requirements of detailed aerial reconnaissance. To execute this mission, the supersonic high-altitude SR-71 reconnaissance aircraft, having a service ceiling of approximately 24,000 m and a speed exceeding Mach 3, was put into service in 1966. The crews of these aircraft, while in the air defense lethal envelopes, were able to conduct reconnaissance at near maximum speeds, but almost without maneuver, since it was only capable of small g-loads and its turn radius was very large. As American experts figure, the combination of high altitude and supersonic speed gave the SR-71 aircraft crews a number of advantages: continuous observation of them using ground radars, which have large "dead" zones at such altitudes was complicated; and,

it made it impossible for antiaircraft systems and fighters, which sometimes did not have enough time, to organize an intercept. The foreign press pointed out that SR-71 aircraft impunitively succeeded in conducting reconnaissance in Vietnam, China and other regions of the world.

An antifighter maneuver was used by aerial reconnaissance pilots for avoiding meeting enemy fighters along the flight route, and, if it did not succeed, then for hindering their attack. Consequently, in contrast to an antimissile maneuver, it did not undergo substantive changes and, just as during the Second World War, it led, on the whole, to proven turns to attack fighters with a maximum possible angular velocity.

One of the stages in the development of aerial reconnaissance tactics was the attempt to conduct it according to the principle of force. As the Western press notes, the protection of reconnaissance aircraft even by large subunits of tactical fighters did not make them safe from air defense actions. Their main weapon remained speed and maneuver, on the basis of which the capabilities of the secret penetration to targets and the dissipation of air defense efforts were investigated.

The improvement in aerial reconnaissance tactics forced Western military theorists to examine their relationship to its capabilities against strong enemy air defenses, and it remained one of the main types of military reconnaissance. In returning to present days, foreign specialists conclude, that air defenses remain a threat to enemy reconnaissance aircraft and its combat capabilities continue to grow. In examining the development trends of modern air defense systems, they note that large automated control systems for air defense forces and equipment have been developed, within the limits of which a large number of control and warning centers, and radar sites are deployed, equipped with fixed and mobile radars, allowing the coordinates of reconnaissance aircraft to be determined very precisely and to track them after a maneuver. The system includes airborne early warning and control aircraft, (long-range radar detection) which significantly increases air defense capabilites to track reconnaissance aircraft and vector fighters to them. Many control functions for air defense forces and resources are automated, including target detection, identification, and tracking, threat assessment (the degree of importance), and target assignment to the air defense systems. All this has sharply reduced the time from the moment of detecting reconnaissance aircraft to issuing commands for their destruction.

The importance of active ground air defense systems is growing, primarily the surface-to-air missile systems with various guidance systems (radar, heat, and laser, etc.), and of rapid-firing antiaircraft artillery systems. Their number among the troops, and consequently their density in protected reconnaissance areas, is increasing rapidly. Supersonic, all-weather fighters, equipped with multifunction radars represent no less of a danger to reconnaissance aircraft. It is becoming more difficult for reconnaissance aircraft crews to detect attacking enemy fighters because the latter have the so-called "pass" tracking in their new onboard radars to achieve operational surprise during target lock-on and missile launch. It consists of the fact that the radar beam does not follow behind the target and does not track it continuously. Therefore reconnaissance aircraft pilots are losing the ability to detect the

moment of lock-on at the beginning of a constant illumination of their aircraft by fighter radars and to execute a timely maneuver to distrupt missile guidance.

Regarding the issues of employing electronic warfare (EW) systems, foreign military theorists note, that although it complicates the radar detection of reconnaissance aircraft, it does not provide operational secrecy. According to their opinions, chaff is not an effective means of protection against modern air defense radars, which possess high resolution and a moving-target-indicator system. Due to the high radar sensitivy and tuning systems against interference, it has become practicable to detect aircraft flying in the chaff "cloud" of dipole reflectors. The use by their crews of active jamming transmitters allows air defense radars to operate in a tracking mode behind the targets using the emissions of these transmitters, and provides the enemy with the oportunity to use "air-to-surface" missiles with seekers tuned to the jamming transmitter's operational frequency.

What is able to counter the tactics of air defense's growing power? This issue is raising numerous arguments among Western military theorists. Various view points are expressed. Several of them boil down to the fact that, without preliminary air defense suppression, that is, without the use of the principle of force, in general, reconnaissance aircraft crews today will not succeed in executing their assigned missions. However, the Air Force commands of the majority of NATO countries are adhering to another viewpoint. Considering as unsuitable the allocation of forces and equipment to suppress air defenses to support single reconnaissance aircraft flights, it, as before, stems from the necessity to achieve reconnaissance secrecy and misinform the enemy. As a result, the foreign press notes that the issue is arising among aviation specialists that, by what tactical methods is it possible to blunt the vigilance and to misinform the enemy air defense system, which has the advantage over reconnaissance aircraft in forces and has continuous radar information on the air situation at its disposal, if masking from cloudcover, the sun and the dark side of the horizon, does not provide the former effect? How does one conduct reconnaissance, in order to escape from the attack of fighters which detect it first, and acquire the capability for a surprise attack? It is emphasized that the answers to these questions are fairly diverse. According to a majority of foreign military specialists' opinions, in order to not permit the enemy to avail himself of these advantages, the tactical methods of reconnaissance aircraft crews must be based on a deep knowledge of enemy air defenses, the complete use of the combat characteristics of their aircraft, swift high-speed surprise maneuvers, and the integrated use of individual defensive means.

In the further development of tactics, the grouped and massed actions of reconnaissance aircraft have replaced the previous conventional flight of individual reconnaissance aircraft with the reliability being provided by all possible forces and resources. The crews use air defense fire and radioelectronic suppression measures, conducted in support of strike aircraft, and mask their actions against clutter in order to achieve operational surpise and misinform the enemy. Consequently, it is planned to use methods conducted in local wars: flight under the protection of attack aircraft groups and the conduct of reconnaissance from their combat formation, and the concealment of

their intentions by the operations of other aircraft enlisted for maneuvers and the employment of various jamming methods. With these same goals, several reconnaissance aircraft can execute a joint flight, which is observed on enemy radar screens as one blip until the divergence of the crews at the reconnaissance targets. The complex combination of similar types of methods and measures, leading to the enemy's erroneous actions, according to Western experts' opinions, is forcing him to establish the objective of reconnaissance aircraft crews' operations and permits the operations plan to be kept as secret as possible, in order to prevent him from having time to organize an intercept.

Regarding the range of reconnaissance aircraft flight altitudes, foreign specialists are finding it difficult to select an optimum altitude in light of heavy PVO opposition. Many of them are holding onto the old traditional low altitudes. They think it is difficult and sometimes impossible, to intercept and destroy reconnaissance aircraft, capable of flying a great distance in a short period of time, if they operate at low altitudes. Fighters and long- and medium-range SAMs have neither sufficient time nor space for this. Therefore, it is considered that, in order to increase the probability of executing missions, the flight of reconnaissance aircraft must be carried out at the lowest altitude possible and at the highest speed possible. These views are finding reverberations in practice. For example, the crews of the American RF-4C reconnaissance aircraft conduct reconnaissance at altitudes of 30-50 m during the day and 300 m at night at speeds of more than 800 km per hour.

However, other opinions are being expressed. Several foreign military experts affirm that the flight of reconnaissance aircraft at very low altitues is still not able to provide them any concealment nor overcome fighter and ground PVO system opposition. This is evident in that the enemy's airborne warning and control system permits individual low-flying targets, at a distance exceeding 250 km, to be tracked and to vector fighters, which are able reliably to detect and attack these targets against the earth's background. They envision the way out of this position to be the use of other altitudes, including very high altitudes, at which pilots can maximumly use the aircraft's combat characteristics, and above all, great flight speeds.

Stemming from that accounted above, capitalist countries plan to use high-altitude aircraft, as previously, along with reconnaissance aircraft developed on the basis of the series tactical fighters such as the RF-4 and RF-5E, to execute aerial reconnaissance missions. For example, in the U.S. Air Force, as previously, the earlier mentioned SR-71 and U-2 reconnaissance aircraft, with various modifications, are part of the inventory. On the basis of the latter, the new high-altitude TR-1 reconnaissance aircraft was developed and is being produced. The first subunit of these aircraft is standing combat alert in Great Britain.

According to foreign military experts' calculations, the integrated use of tactical and high-altitude reconnaissance aircraft, equipped with modern equipment, and parallelly selected tactical methods, will provide a significant increase in the combat capabilities of the aggressive NATO bloc's reconnaissance aviation.

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NATO SEEKS INCREASE IN TAC AIR'S SORTIES PER DAY

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 9, Sep 86 (Signed to press 10 Sep 86) pp 35-37

[Article by Col P. Shiryayev; "The 'Sortie Generation' Program"]

[Text] In the process of continually preparing for a war against the USSR and other countries of the socialist persuasion, the military leadership of the countries which are members of the aggressive imperialistic NATO bloc are exerting great efforts toward building up the combat capabilities of their air forces, one of the armed forces' most mobile elements. Consequently, as the Western press notes, along with the growth in the number and the improved quality of aircraft and weapon systems, a great deal of attention is being paid to the issue of increasing the number of tactical aviation combat sorties while rendering direct air support to the ground troops, interdicting the battlefield, struggling to achieve and maintain air superiority, and executing other missions without changing the aircraft fleet--that is to say, increasing the sortie generation capability.

The greatest attention is being paid to this issue in the U.S. Air Force command, which is planning and carrying out a number of measures to increase the combat sortie generation capabilities of tactical aviation units and subunits for their participation in various air operations by not less than 50 per cent by the mid 1990s.

According to foreign military experts' evaluations, the number of sorties per aircraft during a 24 hour period depends on many factors, including the time required to prepare the crew and equipment for a turn-around sortie, the condition of the runways and taxiways after the delivery of enemy attacks on the airfield network, the presence of the threat to use chemical and biological weapons, the degree of damage to the airfield structures, and the number of surviving ground personnel. Hence, they figure that to increase the number of sorties it is necessary to resolve operationally a whole set of missions, including reducing the time to prepare the crews and aircraft for a turn-around sortie, the rapid removal of holes and damage, received by tactical fighters in a previous combat sortie, and the rapid runway and taxiway repair, etc.

According to Western experts' opinions, the intensification of combat sorties is possible only in the case, when the dependance of aircraft on the airfield's condition is reduced, that is to say, they must be adapted for operations from short and not quite even runway sections, which is characteristic of the airfield network during wartime. In considering the importance of this issue, the U.S. Air Force command decided to step-up the conduct of RTD&E in this given realm, and financed a special "Sortie Generation" program, which was carried out by Wright Aviation Laboratory. The program's main goal is to develop a basic model for improving the runway characteristics of future generation tactical fighters. Simultaneously, work is also being carried out to improve the existing aircraft fleet, with the task of receiving actual near term results.

According to foreign press reports, at the present time, research has begun at test beds and runway laboratories, directed at determining the minimum acceptable repair level of runways, subjected to an air attack, from which fighters can execute an emergency take-off and landing. In studying mathematical modeling results, American researchers, concluded that the optimum variant for solving the given issue is the development of conditions where an aircraft can take-off and land on a runway 5,000 by 50 feet (1,524 x 15.24 m) (1 foot = 0.3048 m). This is substantiated in that the typical NATO airbase has a runway 8,000 to 10,000 feet (2,400-3,200 m) long. Dividing it into two parts, each of which can support a take-off and landing to an equal degree, halves the airfield's vulnerability to enemy air strikes.

When the first test results were reported to the Air Force Operations Command, their representatives expressed doubt in the possibility of an emergency landing and take-off on a runway with such dimensions, especially in bad weather, on a wet surface or strong cross wind. In order to verify these results and obtain actual indicators, the laboratory command arranged with the Air Force command to conduct flight test of the series F-16 tactical fighter, equipped with an improved take-off and landing gear, at Eglin Air Force Base (Florida). A special section with the dimensions of 5,000 x 50 feet was set up on the main runway there.

As the foreign press reports, one of the alternative, which is being studied by laboratories, is the use of the catapult effect, the idea of which was first implemented in Great Britain. Such a take-off method, according to American specialists' calculations, enables the take-off distance to be reduced by 70 per cent. It is proposed to positions catapult apparatus near aircraft shelters which enables their dispersal and makes them least vulnerable.

The results of the research described above should receive practical application in the Air Force in the next few years. Specifically, the U.S. Air Force intended to test the take-off of an actual aircraft using such a catapult apparatus during the next three years. In the more distant future, the laboratory will continue to work on improving take-off and landing equipment and methods. With this goal, McDonnell Douglas is building a special variant of the F-15 aircraft equipped with nozzles, which change the jet exhaust's direction in the vertical and horizontal planes. American specialists figure that this will allow the aircraft to take-off with a

complete fuel supply and payload from a 1,000 feet (304.8 m) runway and to land on a 1,250 feet (351 m) extended wet field.

Besides that discussed above, work is being carried out in the U.S. aimed at providing stability and controllability to an aircraft during take-off from an uneven runway. Western experts consider, that one way to insure a safe take-off from uneven surfaces is to use so-called super-absorbent shock absorbers. The later maintain aircraft stability during a take-off by absorbing overloads (jolts) arising from the unevenness in the take-off surface. Another way is to reduce the aircraft's break-away speed. Judging by Western press reports, work is being carried out in the U.S. in both directions. For example, the firm Cleveland Pneumatics is developing an improved flexible shock absorber, and the Air Force and Lockheed financed a research program to investigate the possibilities of aircraft break-away at the lowest take-off speed, decreasing the take-off distance by an earlier transition by the aircraft to large attack angles and the use of the lift effect. Unconventional take-off techniques are being made possible by injecting stored energy (for example, the compressed air from the engine compressor) inside the landing gear extendors. At first, the gas is abruptly injected into the nose landing gear at low take-off run speeds, resulting in an early break-away of the nose wheel and the formation of a ("reared up") take-off attack angle. Then at the calculated speed, the gas is injected into the main landing gear extendors, resulting in the aircraft's break-away from the runway, thereby achieving the most significant reduction in the take-off distance. It was planned to complete tests of this take-off method in the summer of 1986.

As the foreign military press confirms, other NATO countries, besides the U.S., are implementing measures, directed at improving aviation's combat sortie generation capabilities.

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SIGNAL PROCESSING IN MODERN RADARS

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 9, Sep 86 (Signed to press 10 Sep 86) pp 37-40

[Article by Lt Col V. Pavlov and S. Grishulin; "Signal Processing in Modern Radars"]

[Text] Currently, within the framework of the aggressive NATO bloc, an extensive program for modernizing existing and developing new radars is being carried out for the purpose of expanding their assigned tasks. The introduction of modern computer equipment into radars, providing more effective radar signal processing, including adaptive modes of operation depending on the target and jamming situation is considered to be a decisive factor in this process. According to Western specialists' opinions, the implementation of digital methods for forming and processing radar signals is allowing important radar characteristics to be improved, such as the resolution, the accuracy of determining coordinate information, and the capability for real-time tracking of a large number of targets.

In the formulation of modern radar signal processing algorithms, foreign experts are proceeding in the direction of calculating such features in them, which are stipulated by target range, radio wave propogation conditions, and target movement in various planes along the flight path. In addition, a specific type of sounding signal, the "signal-to-noise" ratio, and other parameters, of both the radar and the target are being taken into account in these algorithms.

Radar signal processing is usually divided into stages. The first stage combines the operation of detecting the signals reflected from the target and decision-making based on their presence for various criteria. During the second stage, coordinate information is determined, first the target range and then its movement speed. Both active and passive methods, based on correlation processing and matched filtering methods, are used for this.

Along with detecting the signals reflected from the targets, a no less important task during their processing is considered to be providing the capabilities to extract more complete information from the reflected signals for subsequent descrimination. This is achieved by the extensive use of

composite large bandwidth signals, which produce its duration on the width of the frequency band being used.

In developing modern radars, NATO country specialists are paying a great deal of attention to the extensive introduction of various types of computer equipment, which is a main component of a radar signals processing unit. The main attention is being devoted to a PSP (Programmable Signal Processor), which allows the radar's operations algorithms to be improved along with using digital processing methods. This will result in implementing the capabilities of flexible use of adaptive methods in future radars, leading to the development of computer units on the basis of a distributive architecture. One of these units, the DAP (Distributed Array Processor) embodies a processor, formed on the basis of a distributive array, consisting of a PE (Processing Elements) set and supplementary memory units. As the foreign press notes, such a construction allows computing to be optimized, and the parallel processing of radar signals to be accomplished.

Currently, practically all radars are equipped with digital radar signal processing units, on which success in the VLSI (Very Large Scale Integration) and also VHSIC (Very High Speed Integrated Circuit) technology development realm exerted an important influence.

Practically all processors digitize signals and as a result, the incoming signal, feeding in from the antenna unit, is converted to an intermediate frequency and demodulated by a discriminator. The signal samples, received as a result of the periodic frequency discrimination, exceed the spectrum width of the source signal, and are converted to digital form using analog-to-digital converters and recorded in the memory for subsequent summation according to single cell resolution. For example, radar signal processing in the COBRA DANE radar is carried out in a digital processor at a speed up to $1.5x10^9$ bits per second. Control of this radar's modes of operation, including the selection of the radiatied signals form, is accomplished by a CYBER 74-18 computer with a total memory of 131,000 60-bit words, and an speed of operations equal to 2.8 million operations per second. The CYBER 174-112 computer is used in the COBRA JUDY radar, and the AN/UYK-7 computer in the AN/TPS-59 radar, allowing real-time signal processing from 500 targets to occur.

It is also reported that the older IBM-7090 computer is being replaced by the new-generation CDC, 170-865, MODCOMP 2/75 and CDC 2551 computers at the BIMBUS system radar sites. It is planned to install similar computers at the PAVE PAWS system radar sites.

Besides digital radar signal processing units, analog units, which successfully compete with digital ones in a number of features, are finding use in various radar types. To these, in particular, belong charge-coupled devices (CCDs)(PZS in Russian) and surface-accoustic wave devices (SAW)(PAV in Russian).

CCD signal processing units are used for storing radar pulses during one or more repetition periods, necessary for carrying out coherent processing. Such

units can operate in the temperature range from -55 to +75^{0}C and provide signal storage for approximately 3 sec.

The extensive use in radars of composite radar signals with a bandwidth of 10^6 led to the requirement to include SAW delay lines in processing units, possessing slight attenuation. SAW amplifiers possess an adequately high gain coefficient (up to 50 dB) and a dynamic range within the limits of 6-70 dB with a several megaherz signal band. The compression coefficent, provided using a SAW device reaches approximately 100. Such devices are used in the PATRIOT SAM radar, the AN/FPS-116, and several other radar types. Their main advantages in comparison with digital units is considered to be their small cost and size, high reliability and low energy consumption.

Currently, foreign specialists in the realm of radar signal processing are concentration their efforts on the use of devices based on fiber and integrated optic components in radars. The development of these directions, according to their opinion, will contribute to the discovery of new capabilities for real-time signal processing. The implementation of such devices are the result of important successes, achieved with the development of wideband fiber optic systems, communications equipment and fiber optic manufacturing technology. Besides this, research is being carried out in the realm of developing devices for forming and processing wideband and very wideband signals, having a frequency range of 1 GHz and more. A number of other tasks are simultaneously being solved, connected with increased radar capabilities for detecting and tracking targets in conditions of artificially-created and natural interference.

They think that new achievements in the development and technology of building processing units and in the realm of circuit engineering will find extensive use in future radars. The use in radars of a component base built on the principle of integrated digital circuits, used in computer equipment, will allow the number and size of components to be reduced, which is necessary in order to be included in radar signal processing devices.

One of the most important areas of radar information processing requiring a significant amount of computer input is the moving target indicator process (MTI)(SDT in Russian), accomplished by Doppler signal filtering methods. The greatest efforts are being directed at the development of adaptive MTI systems, which permit their characteristics to be changed depending on the change in the external environment (including the influence on the radar from passive ground clutter, background clutter and precipitation/hydrometeors). According to foreign specialists' opinions, it is very difficult to achieve an effective moving target indicator and clutter suppression of more than 20 dB using analog processing devices in existing radars. Clutter and interference are more effectively suppressed (to a magnitude on the order of 50-60 dB) by digital MTI devices. However, the implementation of such features will be possible only with a significant (by several orders of magnitude) improvement in the accuracy parameters of digital processing units and an improvement in their stability in comparison with analog units.

Since interfering ground clutter, in general, is considered to be nonuniform, the use in radars of a detection threshhold with an average clutter level will

lead to an increase in the probability of false alarms. In order to solve this problem, special devices for forming so-called clutter cards will be used in varous types of ground-based surveillance radars. These devices embody part of a computer, in which information concerning the interfering clutter and passive interference are stored, being directly updated in the survey process. Information on the interfering clutter level for each resolution cell in the computer memory is represented as "azimuth-range" coordinates.

Flocks of birds may create an important problem for ground-based radar MTI systems used for air defense and air traffic control purposes. The clutter signals from them will lead to the overload on the radar processing units, preventing the detection of real targets. They think that an effective solution to this problem is to use the methods of optimizing the detection threshhold, based on the analysis of variations in the signal amplitude distribution, reflected from birds and aircraft. As a result, a radar's entire operational zone will be broken down into smaller sections (for example, 7.5 x 7.5 km) and the signals from targets within the boundaries of each will be assigned groups, depending on the Doppler frequency. Such a method, requiring a large number of computations and high speed of operations, can only be accomplished by using universal digital computers.

The next stage in the development of such types of systems was the development of a programmable microprocessor, which provides effective target selection against a clutter background by using supplementary memory units. A programmable processor embodies an adaptive digital unit, in which the programming of processor operations is carried out and also equipment's capabilties can be expanded by using a modular building structure. A similar processor passed operational tests in air traffic control radars in Bennington (Vermont), after which it was decided to introduce it into the more improved ASR-9 type radars, and also to widely use similar processors in military purpose radars, including those used in air defense systems.

It is planned to further modify secondary radar information processing units. Secondary processing is a combination of operations connected with the formation of target flight paths on the basis of radar markers received by the radar after several consecutive scans, and also the extrapolation of flight path parameters. In connection with the necessity to process information in a radar on a large number of various types of targets, having a very wide range of speeds, the problem of automating radar information processors by using computers is emerging, and also high-capacity specialized analog and digital processors.

Along with secondary information processing by radar computers, other functions will include the control the modes operation of the radar and its subsystems, information processing for output on display units and the transmission to command posts and control centers, the control of phased-array antenna (FAR) subsystems, and also the monitoring of the radar parameters. In the operator training process, computers can also be used for duplicating targets with various tactical-technical characteristics. As a result, a central computer will execute the tasks of plotting flight paths, target tracking and controlling the radar modes of operation, including the control of radar resources. Using it, the emission time, radiation power, the probing

signal parameters, the radar antenna's directional characteristics, the detection threshhold, and the MTI system operational times can be controlled. For example, a central computer of ground-based multifunction radars with phased array antennas (AN/TPS-59, S-73 and others) execute several missions simultaneously, including target search, their detection and lock-on, tracking and flight path formulation.

As the foreign press notes, algorithms for a radar's functioning for search, detection, tracking and control modes of operation are very different, which leads to the use of special subprograms included in the computer programming support. The control programs permit the radar's operation to be distributed at a rate corresponding to the speed of the radar subsystem operations. Such subprograms will also serve to provide evaluation and control the load on the radar subsystems, the storage of test information, the execution of comminications and the information exchange between processing and information receiving equipment, included in the air defense system.

The advent of electronically-controlled radar antenna directivity has led to the requirement to use special computers which control the phased array antenna elements along with the information processing units. The ANS/FPS-85 radar was one of the first radars with a phased array type antenna system, in which the electronic directional scanning was accomplished along two coordinates using electronically controlled phase shifters, provided by seven-bit diode control circuits. The development of such type radars with phased array antennas required the use of digital computers to control the radar operations, and also confirmed the fact, that the cost of program systems can be a large part of a radar's total cost.

In phased array antenna type radars, the control signals formed by the central computer go to the phase-shifters of each antenna element along lines, numbering in the thousands for large phased array antennas. With the development of later radar types with phased array antennas, they achieved the capability to use microwave transceiver modules and their accomodation directly in the antenna aperture along with control units. The control function of the phased array antenna elements can be more effectively carried out directly in each module by using a large number of microprocessors, corresponding to the total number of FAR elements. Such a system contruction, as foreign experts figure, allows large signal phases to be determined by using known information on azimuth, angular position, the main beam's direction in the phased array antenna beam pattern. Also, the search signal's carrier frequency, and the beam pattern control commands are formed in the computer. The new technology for developing FAR systems provides the capability to use control information, received directly from the microwave transceiver modules, and to transmit it to the FAR elements along a single line. Consequently, a phased array antenna with three-dimensional power can be controlled directly on the carrier frequency with the signal transmissions control according to azimuth and the angular position. Depending on the carrier frequency of the radar emission, and also on the main beam's directional pattern, a microprocessor can send specific corrections to the phase signal control units. For example, in a number of phased array antenna radars, having active components (AN/FPS-117, W-2000, GE-592), each element,

which the transceiver modules contain, can be corrected by the return communications signals, formed by the control units.

The use of processors in phased array antennas also allows the operational efficiency of the antenna array module elements to be monitored, including the phase shifters, power amplifiers and switches, on which first the antenna system's operational efficiency depends. According to Western specialists' confirmations, in the future such processors will provide the capability to search for and to locate malfunctioning modules and other phased array elements, restoring the radar's operational efficiency.

The increased effectiveness of radar systems is not thought about abroad without the extensive use of new achievements in the realm of radar development and construction technology, including a new component base, the introduction of which is leading to qualitative changes in radar systems. These changes will be based specifically on the extensive use in radars of phased array antenna systems, control computers, and processors for processing radar signals. In the end, this will essentially increase the employment effectiveness of radars under complex combat conditions.

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ADAPTIVE WING TESTS IN U.S. ON AN EXPERIMENTAL AIRCRAFT

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 9, Sep 86 (Signed to press 10 Sep 86) pp 40-43

[Article by Col N. Nikolayev; "Adaptive Wing Tests in the U.S. on an Experimental Aircraft"]

[Text] U.S. militaristic circles consider the development of new, more effective types of combat equipment and weapons, and the equipping of all branches of forces, including the air force, with them, to be one of the most important measures in their attempt to achieve military superiority over the Soviet Union. For example, for the purpose of improving the flight characteristics and combat capabilities of tactical fighters, American aviation specialists are investigating new aerodynamic and design configurations for aircraft, their flight control principles, and also future design solutions for individual parts of an aircraft.

One of these technical solutions is considered to be the use, on aircraft, of an adaptive wing, the geometric shape of which can be changed in flight, providing the most effective aerodynamics for each specific flight condition. The attempt to satisfy the effectiveness requirement for a wide range of flight conditions has led to the development of a wing with a variable wing sweep and the use on it of leading-edge flaps, which change the camber to some extent. However, the deficiency of leading edge and trailing edge flaps has shown that, with their deviations in shape, the wing shape is changed unevenly, resulting in the occurance of additional drag and preventing the complete use of the effect of the camber change. As a result, the idea arose to develop an adaptive wing, with a smooth variable camber, providing maximum aerodynamics in each flight mode. According to American experts' evaluations, such a wing allows the aircraft's flight range to be increased by 30 per cent and the maneuverability characteristics to be improved by 25 per cent.

According to foreign press reports, in 1970, the U.S. Navy command contracted the firms, Boeing, Grumman and General Dynamics to investigate the possibilities of developing a smooth variable-camber adaptive wing. It was planned to use such a wing on carrier-based aircraft. In 1975, the Air Force command joined these contracts, and in 1979, the Boeing company was issued an order valued at 12.5 million dollars for the design and manufacture of such a wing. This firm already had experience in the research, design, manufacture

and operation of trailing edges on the Boeing 747 aircraft which approaches the design of an adaptive wing.

One of the leading series F-111 fighter-bombers, used earlier for flight tests in the realm of transonic speeds according to the TACT (Transonic Aircraft Cruise Technology) program, was selected for the adaptive wing flight tests. Its wing has a supercritical shape, a 20 per cent increase in surface area (up to 58 m^2), and also a slight design change in the torsion box compared with the series F-111 fighter-bombers, which won fame for the barbaric bombing on Libiyan territory in April 1986. The experimental aircraft for the adaptive wing flight tests received the designation, AFTI/F-111.

The foreign press notes, that Boeing modified the TACT program F-111 aircraft wing, installing on it leading edges and trailing edges attached to the torsion box, instead of leading edge flaps, ailerons and spoilers, forming a smooth, variable-camber wing. The leading edges have one section along the entire span of the wing panel and can be deflected upward to 1 degree and downward to 20 degrees. Slots in the adjoining leading edges are covered with a flexible glass fiber sheathing. With a deflection of the leading edges, the upper and lower sheathings bend and slide along the wing surface, providing a smooth contour shape.

The trailing edges of the wing panels consist of two panels along the span. They can be deflected upward to 1 degree and downward to 18 degrees. Slots between the panels are covered by a flexible sheathing, providing a smooth contour shape (a diagram of the trailing edges design, used on the mock-up which was manufactured in the process of developing the wing is shown in Fig. 2). The inboard sections of the trailing edges are only deflected symetrically, but the middle and outboard sections are deflected both symetrically, and differentially for control during a turn, replacing ailerons and spoilers.

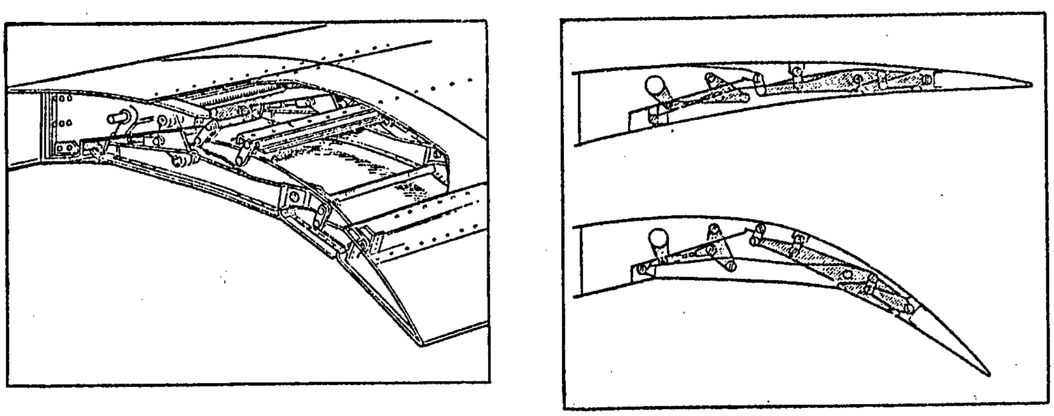

Figure 2. Schematic of Adaptive Wing Trailing Edge Construction

The control of the wing camber change is accomplished independently of the triple redundant flight control system, using dual digtal and dual back-up analog computers. The later are only used for turn control and one digital

computer can independently control a change in wing camber in case of the other's failure.

Each section of the trailing edges and the leading edge are connected with rotary gear drives through a system of levers, hinges and tie rods. The gear box has its own an input shaft, rotated by two-speed hydraulic motors controlled by various computers. The rotational speed of the input shaft can reach up to 10,000 rpm, and the angular speed of deflection of the trailing edges inboard sections can be up to 30 degress per second, of the outboard sections up to 40 degress per second, and of the leading edges up to 15 degrees per second. The wing tips are also flexible and change camber with the deflected leading edges and trailing edges.

During flight, wing camber control can be carried out manually or automatically. With automatic control, it is first planned to investigate the following control modes: cruise, maneuver, maneuver load control, and a maneuver enhancement/gust alleviation mode.

CRUISE MODE In this case, the leading and trailing edges are positioned according to speed, providing the maximum aerodynamic performance while cruising. With a fully operational control system, the pilot will input the required air speed, flight altitude and the positions of the leading edges, trailing edges, stabilizer, but the throttle must be regulated automatically to enhance the cruise flight characteristics.

MANEUVER MODE The forward edges and trailing edges are positioned to provide the maximum aerodynamic performance during a turn, thus, maneuvering can be carried out for a longer time without a loss in speed. The relationship of the leading and trailing edges' positions to the lift coefficient, the wing sweep angle and airspeed for such a mode was worked out according to information received from wind-tunnel models. This relationship is being input into flight control computers and used for load changes during the maneuver process. In the same mode, a change in the wing camber can occur up to 50 times a second.

MANEUVER LOAD CONTROL MODE According to the extent that the aircraft achieves a maximum load, the outboard sections of the trailing edges automatically decrease the camber of the wing tip sections, and subsequently, their lift. As a result, the pressure centers on the wing panels are displaced toward the fuselage and the bending moments of the wing's hinges are reduced, which permits the load to be additionally increased, not exceeding the wing's permissable bending moments.

THE MANEUVER ENHANCEMENT/GUST ALLEVIATION MODE On an aircraft with a conventional wing, the approach to large loads causes large losses in lift, since the load on the stabilizer for positioning to a turn must be negative. On an aircraft with an adaptive wing, the positioning for a turn is accomplished with an increase in the wing camber without a loss in lift. At the moment that the attack angle reaches a value sufficient to develop the required lift, the camber is smoothed out. Thus, the maneuver enhancement mode significantly hastens the positioning for a turn. In case of a load reduction

due to wind gusts during vertical air movement, neccesitating an increase in lift, the wing camber is slowly decreased, thereby reducing the load on it.

It is considered that the wing camber control modes discussed above can be superimposed one on the other or follow one behind the other, depending on the situation. For example, during aerial combat, the maneuver enhancement mode can be used for positioning for a turn, and then for reducing drag, the maneuver mode can be used. When approaching the maximum wing load, the maneuver load control mode is switched on, changing the wing load distribution and acheiving a higher load. These modes can follow one after the other automatically depending on the limitations established earlier.

Four other camber control modes are being considered as part of the subsequent program which, as American specialists believe, will require the input of new flight control programs into a computer. In an individual control mode for the trailing edges during cruise flight, the separate sections of the trailing edges will be deflected independently of one another for the purpose of developing the optimum combination for cruise flight. Hence, a significant reduction in drag during a flight with large lift coefficients is expected. In a cruise camber control mode, with an altitude change, the favorable flight altitude and optimum deflection of the trailing edges for it will be selected. In an automatic throttle control mode, the minimum fuel expenditure or minimum time for a climb to the assigned altitude is achieved. Finally, a maneuver load control mode, based on direct load sensors, will be tested. The former load sensors will be replaced by strain guages on the wing root.

Judging by foreign press reports, the adaptive wing flight test program on the AFTI/F-111 aircraft, being carried out by the Air Force and NASA, will require approximately three more years than previously planned due to the delay for wind tunnel investigations and problems arising in the mathematical support of the wing camber control. It is planned to conduct the AFTI/F-111 aircraft flight tests in two phases. After the aircraft's first flight, it is intended to investigate and to correct all emerging defects and then carry out a ten-month flight test program with manual wing camber control by the pilot in the second stage. Flight tests must be conducted at flight speeds, not exceeding M=2.0, wing sweep angles up to 58 degress and a dynamic head of up to 6,635 kg/m^2, corresponding to high subsonic speed with maximum wing sweep. After the first phase, the flight tests will be interrupted for three months, during which time a digital flight control system will be installed on the aircraft for automatically controlling the wing camber in the second test phase (lasting approximately one year). In all, it is planned to complete 75 flights over a 20 month period within the flight test program. The program expenditures are assessed to be 50 million dollars.

The first flight of the AFTI/F-11 aircraft was carried out in October 1985, and lasted 1 hour and 20 minutes. The aircraft gained an altitude of 4,570 m with the wing camber control aiding in the control during a bank and the supporting an effective climb to altitude. In horizontal flight, the wing camber was changed from a large camber (for the creation of maximum lift) to a small one (for optimum cruise speed). The maximum instrument speed was 555 km/hr. At an altitude of 3,300 m, a landing approach and a landing, with leading edges and trailing edges deflected in the landing mode, were

simulated. It is planned to conclude the flight test program in 1988, and their results will be used in the development of the future ATF tactical fighter.

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AMERICAN AIR CUSHION LANDING CRAFT

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 9, Sep 86 (Signed to press 10 Sep 86) pp 50-54

[Article by Capt 1st Rank (Reserve) V. Marin; A. Vishnevskiy; "American Air Cushion Landing Craft"]

[Text] The U.S. Navy command, following a course of increasing naval power as the most important means of realizing its agressive ideas, has always paid much attention to developing the amphibious forces, fundamental to which are landing ships of various classes designed to transport the landing forces to landing areas and amphibious assault systems, delivering the force from the ships to the shore.

Up to the middle of the 1950s, these missions in the U.S. Navy were executed exclusively by displacement landing craft, comparatively cheap to produce and capable of accepting all types of Marine Corps weapons and combat equipment. In American specialists' opinion, a substantial shortcoming of these craft is the fact that their speed does not exceed 9-12 knots. Therefore, during landings they are in the water for a very long time with onboard personnel and landing equipment being subjected to the intense opposition of enemy fire. Additionally the capability to employ displacement craft is limited by the character of the beach, water depth in the immediate littoral zone and weather conditions.

A search for new means of landing amphibious forces led to the appearance of assault-transport helicopters which came into the USMC inventory in 1965, and continues to be modernized. They have high speed, mobility, and are capable of delivering personnel and combat equipment deep into enemy territory, but their lift capacity is limited. In connection with this point, displacement craft were the only way to transport heavy equipment and weapons.

In 1965, the U.S. began work on the Amphibious Assault Landing Craft (AALC) program, whose objective was the creation of an amphibious assault system, having high speed and sufficient capacity. During the first three years, various landing craft were tested, differing from each other by the type of support, speed and capacity. Since 1968, all efforts have been concentrated only on the design of air cushion craft, with speeds up to 50 knots, capable of accepting all kinds of Marine Corps equipment including tanks. Two

experimental air cushion vehicles (ACV), JEFF-A and JEFF-B, which have practically the same dimensions and specifications, but different construction plans.(1) As a result of their experience, the U.S. Navy decided to deploy serially constructed ACVs of the LCAC type (Landing Craft Air Cushion). This was the basis for the JEFF-B craft project. During project development, the most successful technical aspects of JEFF-A were considered.

In 1980, a competition, in which three firms participated, was conducted to select a contractor. The winner was Bell Aerospace Textron who worked up the JEFF B ACV project plan. In April, 1981, an order for a working model LCAC was made and, in 1982, orders were taken for the first six craft and, in the following 3 years another 18 such ACVs. In all, by the middle of the 1990s, the plan is to construct 90 ACVs of the LCAC type, including 66 units by 1991. By foreign press estimates, the total cost is about 3 billion dollars.

To base, service and repair these craft, two special centers are being established, one at the Marine Corps Base at Camp Pendleton, California, and the other at Little Creek Amphibious Base in Virginia. They can put 45 of these ACVs at each site. Work at Camp Pendleton has been under way since May, 1984. Construction of both basing centers will be completed in 1994-95.

In 1984, the lead landing craft, LCAC-1, was delivered to the Navy. It is said that during the bimonthly shipyard and subsequent fleet tests, the cutter surpassed normal expectations in speed, range, seakeeping and capacity. Delivery to the Navy of the first portion of the 6 cutters is expected in the middle of 1986, after which they will be made a part of the combat ready fleet forces.

As the craft are brought into the fleet, they will be formed up as detachments (divisions) with 6 units each. The first division is expected to be formed in 1986, at Camp Pendleton, the second at Little Creek in 1987.

LCAC type craft are designed to deliver from landing ships primarily heavy combat equipment and cargo and, if necessary, personnel. Their dimensions allow accommodation of up to four ACVs in the welldecks of the assault ships. Amphibious lift capacity of an ACV is specified by its nominal cargo capacity of 54.4 tons (maximum load 68 tons) and by the dimensions of its cargo deck (20.1 x 8.5 m). It is said that one ACV can accommodate one M1 tank, or five light-armored vehicles (LAV), or three tracked amphibian armored carriers (LVTP-7).

By Navy requirements, LCAC craft, with a nominal load, must achieve a speed of 40 knots in sea state 2 and with headwinds of up to force 4 and 30 knots under the same external conditions and maxiumu load (or in sea state 3, force 5 headwinds and nominal load.) Cruising range is 200 miles at full speed and 300 miles at 35 knots. Fuel capacity is 25 tons.

In design, the ACV, for the most part, is similar to the experimental JEFF-B. In addition, as foreign specialists have remarked, they have applied a whole range of new construction-design concepts, making them higher technologically in production and operation.

The LCAC weighs 149.5 tons fully loaded, is 26.8 m long, with a 14.3-m beam, a height of 7.1 m, and a draft of 9 m in a water displacement mode with nominal load. The rigid hull is actually a solid airtight pontoon (Fig. 2) measuring 24.7 x 13.4 x 1.4 m. Its construction incorporates 3 longitudinal and 19 transverse bulkheads, set apart at distances of 3.9 m and 1.4 m from each other respectively, side plating, a bottom and an upper deck. In the bulkheads there are special openings and hatches, with watertight doors and coverings, affording access into the interior compartments of the pontoon. Bulkhead thickness is :2.5 mm for the transverse ones, 9.5 mm for the central portion of the upper deck, and 3.3 mm for the side plating, bottom and side sections of the deck. All are reinforced with ribs, set 0.2 m from each other. On the bilge bottom are located four landing mounts in the shape of a block measuring 5.2 x 0.3 x 0.3 m.

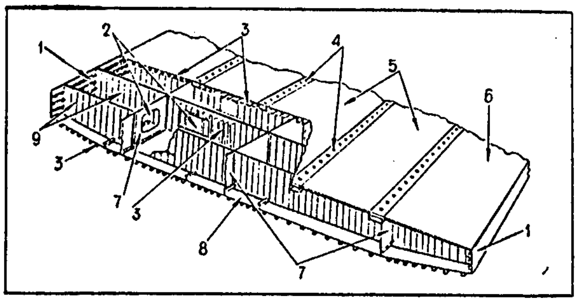

Figure 2. Hull Design of an LCAC-Class Landing Craft

1. Side plating (thickness, 3.3 mm);
2. Watertight hatch and door;
3. Stiffening rib;
4. Sockets for shoring for cargo and equipment being transported;
5. Cargo deck (9.5 mm);
6. Engine compartment deck (3.3 mm);
7. Longitudinal bulkhead (3.3 mm);
8. Bottom (3.3 mm);
9. Transverse bulkhead (2.5 mm).

The central portion of the upper deck has an area of 170 m^2 and is used as cargo space. On it, flush with the deck, are four special rails with sockets specifically for securing transported cargo and equipment. The craft is equipped with bow and stern ramps 8.2 and 4.6 m wide respectively (with a 14^0 angle to the ground), permitting bow-to-stern through passage of equipment.

From the sides, the deck is organized into two islands, 2.45 m wide, which, in contrast to the prototype superstructures, are not a continuum of the construction of the rigid deck, but are bolted to it instead. That scheme, the designers estimate, permits a reduction of weight with equivalent structural strength of the pontoon. Another peculiarity of the superstructure islands is the fact that they are built, not as complete units, but in the form of modules (out of three functional blocks each). The stern blocks of both islands (4.9 m long), are used as machinery compartments, the central ones to accommodate lifting systems. The pilot house in the upper part of the bow block on the starboard side, and in the lower, accommodations for eight troops and an air conditioned electronic equipment compartment. In the bow block on

the port side are accommodations for 16 troops. On the top of this block are places for machine gun emplacements. The LCAC crew consists of five personnel. Four are located in the pilot house and one is in the port bow section.

In constructing the LCAC, 5,456-grade corrosion proof aluminum alloy was selected. It has a specific gravity of 2.65 g/cm^3 and a yield point of 23.1 kgs/mm^2. They fabricated out of this material an all-welded hull and superstructure (on the JEFF-B, there is composite riveted construction). It is considered that this not only simplifies the construction process (about 70 per cent of the welding can be automated), but also facilitates service and repair.

The outer, flexible guards of the cushion are two storied with a height of 1.3 m and consist of a receiver and a row of hanging, multiple transverse elements of an open type extending around the entire perimeter of the rigid hull. In addition, in order to guarantee stability in the stern portion of the bottom area, there is a segmented flexible guard. It includes a longitudinal dual keel and transverse guards, with the same two-storied construction as in the outer guards of the air cushion. The flexible guards are made of synthetic fabric covered with natural rubber.

Included in the lifting systems are four centrifugal two-way suction fans with 1.5-m diameter drive wheels, set in pairs on the port and starboard sides. Part of the air pressed by the fans, falls onto two nozzles, made of fiberglass and capable of rotating 180^0. The nozzles are located in the middle blocks of the superstructure and fulfill the function of an auxiliary engine-rudder system, that is, they are used for steering the craft, creating supplementary support, or providing movement astern. The craft are equipped with a very modern system of dispersing the air stream in the bilge area which, along with the ballast and trim systems, assures an increase in the range of allowable displacement of the cargo center of gravity relative to the cutter's center of gravity, thanks to which loading and unloading work is simplified.

Propulsion is provided by two 4-bladed variable-pitch air propellers, 3.4 m in diameter. They have aerodynamic nozzles mounted on stationary pylons in the stern section. In this regard, the JEFF-B has propellors with aluminum blades, and the LCAC is equipped with plastic blades reinforced with carbon threads, making it highly corrosion proof. In addition, for added protection against corrosion, the blades are covered with a polyurethane film, and their leading edges have special polyurethane facings. It is to be noted that, depending upon the extent of the corrosion, the facing layers can be changed by the crew when the ship is beached.

Steering is accomplished by four vertical aerodynamic rudders, located behind each of the air propellers, or by means of varying the propeller pitch or by use of reverse nozzles.

In contrast to the prototype cutter, whose power plant includes 6 TF-40 gas turbines, the equipment in the LCAC power plant includes 4 TF-40B gas turbine engines, with a maxiumum plant power of 4,400 hp (maximum continuous power 3,955 hp). The turbines are arranged in series along the port and starboard

sides, each of which drives a respective group of fans and air propellers. Cutting back on the numbers of engines, as well as incorporating a number of updates, has allowed the simplification of the general kinematic scheme for the power plant, having only 8 transmissions and 12 driveshafts (The JEFF-B has 14 and 18 respectively). To protect the gas turbines from salt corrosion and against the intrusion of water and hard, abrasive particles (dust, sand), the LCAC cutters are rigged with air filters which have a multistage air cleaning system. This includes external shutter-style filters, static inertial separators (with curved surfaces), centrifugal agglomerators and diffusion separators (barrier filters).

In each of the two machinery spaces there is one 75W turbogenerator which generates 400 Hz AC power. The drive for the generators is a 150 hp TF-62 gas turbine. The general plan of the machinery spaces is shown in Fig. 3.

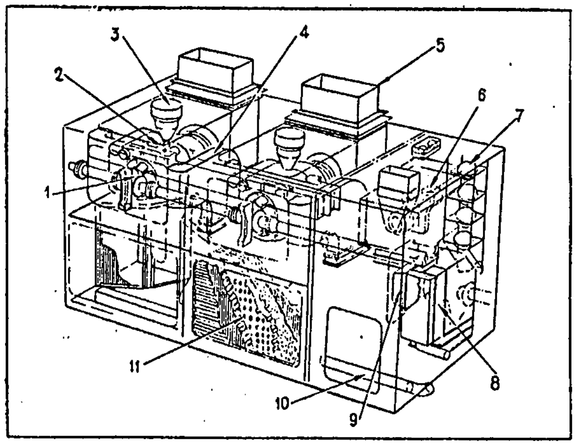

Figure 3. LCAC-Class Landing Craft Machinery Compartment

1. Reduction gear;
2. TF-40B gas turbine;
3. Air exhaust structure;
4. Air ducting;
5. Exhaust gas stack;
6. Gas turbogenerator
7. Fire extinguisher;
8. Air collector with filters for compressed air used in the gas turbine drive of the generator and in the TF-40B cooling system;
9. Gas turbine control station;
10. Air filter purging system ducting
11. Air filter.

In the American command's view, the existence of LCACs in the amphibious forces can have as much influence on the character of amphibious assault operations as the helicopter did in its time. This is indicated above all by the high speed qualities of the ACV which allows a substantial increase in landing tempo and conduct of landing at considerably greater distances from the water's edge. In particular, it is said that in an equivalent time, the LCAC can deliver ashore twice as much cargo from 25 miles out than the displacement ship LCM-6 can from 5 miles. All this, plus the ability of the LCAC to "retarget" to less defended parts of the shoreline limits enemy capability to organize opposition and, in the final analysis, leads to reductions in losses among the landing forces. Also, thanks to the LCAC's

movement on the surface (water and land), they have relatively low vulnerability to naval or land mines; they can easily broach anti-amphibious obstacles in the water; can operate in soft sand and marshy areas; and can make it ashore and maneuver deep into the enemy's defenses.

On the whole, in U.S. specialists' estimate, the application of amphibious ACVs leads to a six-fold decrease in the effectiveness of the anti-amphibious defenses of the opposing force. No less important a characteristic of such craft is the fact that they allow amphibious operations to be conducted in those areas which, at the present time, are not suited for them. Thus, in the judgment of U.S. Navy leaders, if the portion of shoreline accessible with current conventional displacement craft consists today of 5 per cent of the coast of Northern Europe, 5-10 per cent of the Persian Gulf Coast and 17 per cent of the shore line of the World Ocean, then with the use of the LCAC vessels the numbers increase up to 40-90 per cent, 70-90 per cent and 70 per cent respectively.

1. For details on the program and experimental ACVs, see: FOREIGN MILITARY REVIEW, 1983, No. 2, pp.81-84. Ed.

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INTRODUCTION OF ARTIFICIAL INTELLIGENCE METHODS TO INCREASE SYSTEM/WEAPON EFFECTIVENESS IN U.S. NAVY

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 9, Sep 86 (Signed to press 10 Sep 86) pp 54-56

[Article by Capt 1st Rank (Reserve) K. Yakovlev; "The Introduction of Artificial Intelligence Methods to Increase System and Weapon Effectiveness in the U.S. Navy"]

[Text] Militarist circles in the U.S. in planning the arms race pay a good deal of attention to the issues of automating weapon systems, and command and control of forces and warfighting systems. The U.S. Navy, in the course of its daily activities at sea has met up with a number of problems, arising as a result of the burgeoning systems of information and complex weapon systems. In connection with this, in the last few years, in the Navy, as in the other services, work has begun in earnest on development and practical introduction of means of artificial intelligence. They are putting considerable resources into these efforts and are attracting to the work the basic scientific isntitutions of the Navy as well as a large number of universities and commercial corporations.

Research, being conducted in the U.S. armed forces in the area of artificial intelligence to increase the effectiveness of automated systems and improve the man-computer interface, has been directed at solving the problems of automatically distinguishing objects through a complex of indirect symbols, creating expert systems, which enable an operator to make optimal decisions using a dynamic dialogue of the "man-machine" construct in real time, guaranteeing mutual operations of the person and computer in a real professional language, and the design of military-type robot technology devices.

The main organization for introduction of means of artificial intelligence is the Center of Applied Naval Research, which was organized several years ago, as part of the central research laboratory of the Navy. Its mission is to develop and introduce artificial intelligence (AI) technology into operational formations' control systems and into systems of all Navy combat subunits.

One of the important tasks of this Center is to develop information processing systems for controlling combat activities, that is, the application of AI

technology at the point where information must be collected, organized in a responsive form, analyzed and presented in a useful way to a commander for decision making.

In recent years the program of basic research has been widened on account of the fact that it has attracted other navy scientific research institutions and of industry among which were distributed many varied projects, anticipating the use of AI methods.

U.S. Navy AI programs are divided into basic and applied. The Navy's research administration directs work on the basic research program. It lists 33 projects, specifically; intelligent robots, presentation and acceptance of knowledge according to specified object areas; expert systems, interface with computers in natural language, and, identification and warning of conflict situations and others.

The primary (lead) executor of the program is the Naval Academy. Drawn to participation in the program also are a large number of industrial and university laboratories. Along side this basic program, which determins the main direction and courses of AI introduction, various scientific organizations of the Navy carry out various projects for introducing them into fleet practice. Thus the Navy Center for Applied Research has worked out the following proejcts.

EXPERT SYSTEM OF AUTOMATED PROJECTIONS OF RADIOELECTRONIC SYSTEMS AND THEIR DIAGNOSTICS, which would permit optimal selection of sets for a system and diagnose them under operating conditions. Forms and means of diagnosis are selected by highly qualified experts, and applied into systems in advance, before users work with it.

AUTOMATED REPORT TRANSMISSION SYSTEM. This is designed to automate the function of report dissemination using a computer. In so doing, it lays out the "machine understanding of the information" contained in reports and designates the user of the perceived information. First order information, necessary for the system's operation, is introduced by experts at a stage in its instruction. Special attention is paid to presenting the reports in real time, and to data base accumulation. It is considered that executing these tasks will reduce the load on operators in the process of their decision making. An automated control system, developed in the interest of the Marines, allows them to achieve maximum effect in the employment of its forces and systems.

Particular features of this work are the movement forward of proposals for the use of these systems for decision making and other Naval missions. Specifically, its upgraded variant has been recommended for the construction of a system (expert type) of target identification in radars.

SYSTEMS FOR PROCESSING INFORMATION FROM SENSORS, designed to provide for the conduct of reconnaissance, and for systems of zones being defended and controlled, etc. By processing information, received from sensor transmitters, using a chain of microcomputers, which react to changes in the various natural physical fields, one can resolve problems of data collection on the

enemy in an accessible or hard-to-access medium. The solution to this problem became possible by building such knowledge bases in the computer, which, along with data incorporates as well information about the necessityof action with the enemy. Therefore an opportunity is presented of uniting varied information, received from a multitude of sources, such as radio locating, acoustic, seismic, etc.

It is considered, that the organization of sensor systems assures the commander and staff of needed information on the tactical situation.

OPERATIONAL PLANNING SYSTEM, is a consultant system, to assist in compiling operational plans for use by Naval aviation. This problem is solved in the system by dividing it into separate subproblems, being solved by various types of specialists, and the creation for them of systems of programmed support. The special program subproblems are synthesized into a single optimal plan. The plan, worked out by the system, is checked as to conformity to the plan and to the missions assigned to Naval aviation by the high command. This is far from being a full list of problems being worked out by the Center for Applied Research.

Work in a number of Navy scientific research organizations and industrial activities is carried on to increase the effectiveness of control of special forces and the use of weapons. For example, they are developing automated force planners, report analyzers, systems for collecting intelligence information, classificating submarine targets by radiated noise, heuristic systems of detecting target and shape discrimination, trainers, etc.

Below we will look at some issues being worked out in several projects.

The overwhelming majority of systems under design which use AI methods, envision a user interface with the computer without the aid of middlemen-programmers, by using a common use language, natural albeit limited. This will be achieved by including in the system's programmed sets special programs, linguistic processors, which will translate natural language into internal, machine language when addressing the customer's queries to the computer and a translation of the internal language into natural when giving answers.

Introduction of a natural language in military AI systems is not limited by this. American specialists believe, that in military affairs there exist many areas, where it is expedient to apply the capability of understanding the natural language by the machine. Thus, the Center for Applied Research is concentrating its efforts on the use of such capabilities for textual analysis of short dispatches in combat and scientific and technical outgrowths of knowledge. In the Navy, such messages exist in large quantities, and therefore the requirement has risen to analyze them by automatic methods. As the foreign press indicates, data systems are used analyze reports on the defects of combat technology.

Memory systems automatically do a grammatical review of a received report according to parts of the sentence (subject, predicate, etc.) and designate the functions of each part of the sentence, after which the report is transformed into machine format, compatible for storage and use in a computer.

When reporting to a user, the computer changes the report from machine format into a report in natural language. Despite the fact that a system has been developed for the purpose of technical control and material-technical security, designers emphasize that it is applicable in many areas, since it is based on grammatical analysis and synthesis of information, and not on the use of "key words," as was formerly the case.

Among the various systems using AI methods, expert systems have received the most development and improvement. The essence of the latter is the fact that they are filled with the knowledge of very high qualified specialist-experts, useful in the ultimate to all users. One of these, practically realized, is an expert system guaranteeing the operation of the electronic systems of U.S. naval aviation. In its development, they designed such programs which could be used as well for systems of other designation. Based on them, basic expert systems of a new generation were created to classify target shapes received from direction finding equipment and for the use of weapons in accordance with received data.

The latter task was resolved in two stages. In the first, the effectiveness of application of each type of weapon on each detected target was computed. Fifty five factors were evaluated, touching on the capability of the weapon systems, the character of the target and the combat conditions. For example, they evaluated the location of the target, its range from the weapon, personnel readiness, possibility of counteraction, the weapon's condition and their capabilities, etc.

During the second stage, they solved problems related to the most effective distribution of resources. As a result, a plan was worked out on weapons employment and a general probability of destroying the target was calculated. From these system variants, the optimal one was selected.

Besides the optimal plan, which requires considerable calculation time, they are working up a target destruction plan with a probability no less than that assigned. In that case, working time is reduced from 12 minutes to 7 seconds.

They are considering also in the system the following conveniences to users: the capability to control decisions which have been made; use of a limited number of simple commands, operator error warning; and operational assistance in decision making.

Another example of expert system design is a system of indications and warning of armed conflict, done at Stanford University. This surveillance system operates on a Xerox-D computer in the programmable INTERLISP language. It allows the use of inaccurate and ambiguous information and can clarify decisions which have been taken.

In foreign military specialists' opinion on the subject of AI usage, staff systems for operational planning, along with expert systems, must find wide application. Such a system has been developed at the Center for Applied Research to support amphibious forces to develop operational commands, plans, directives, etc. They are based on, and designed after, planning system common principles. In accordance with these principles, the system, depending on

established objectives, divides them into numerous separate components and sub-tasks, the solution of which is optimally synthesized into a single plan of combat action.

As western specialists conceive, the application of a system permits a shortening of the time needed to make decisions and permits the operator to avoid making erroneous decisions, since it will point out to him its inconsistency to the real circumstances. It has a linguistic processor, ensuring commonality with a natural language. The program is written in LISP language. According to information in the Western press, plans are being made to broaden the capabilities of the system to solve other problems.

Among information processing systems, an important place is held by surveillance systems, in which are contained the latest accomplishments of AI in terms of concentration, collation and establishment of the actual facts related to detection of targets, received from mulitple sources. The architecture of such a system envisions special interfaces from different types of sensors (acoustic, radar, electronic warfare, radio intercepts, DF, etc.). The criticality of received information is considered automatically, as are the functions of individual specialists and technicians in receiving information input into the system. All input information undergoes very close checks.

The system is adjusted or tuned by subject matter experts in each interface area (radar, acoustic, communications, DF, etc.). Specialists on the system and the message distribution process complete the work. The system output is supposed to be a dynamic image of all observations out of the surrounding environment. It is planned to design the system along the lines of a dispersed network of information processing centers. Specifically, what is planned is to create a system specializing in collection and processing of surveillance information.

From the above, it follows that the U.S. Navy has taken a first step toward practical introduction of various means of AI for solving problems the fleet is currently facing.

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AMERICAN SSBN BASING IN ATLANTIC

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 9, Sep 86 (Signed to press 10 Sep 86) pp 67-73

[Article by Capt 1st Rank V. Chernov; "American SSBN Basing in the Atlantic"]

[Text] In U.S. militaristic preparations, an important place is occupied by development of the seaborne component of strategic strike forces - the SSBN.

The increase in the combat capabilities of the SSBN will, in Pentagon specialists' view, achieve perfection both in the nuclear missiles, and in the submarines themselves, and the shipboard systems' operational reliability, but maintaining the boats' assigned operational tempo for the most part depends on the character of their care and service in port. This is why, at the same time as they are designing ballistic missile and developing a new generation SSBN, the U.S. is expanding its system of basing and rear services for SSBNs, and is modernizing the systems for repair and resupply. Development of SSBN support systems has become an indispensible element of the program for the overall buildup of the strategic missile force basing.

As is constantly underscored in the Western military press, the main task of any basing and material services system for SSBNs consists of supporting their high combat readiness requirements through a complex of undertakings, associated with conducting various types of repair (from preventive to capital repairs), assuring combat readiness, providing all types of supplies, including ballistic missiles, as well as providing and training personnel to fill out the crews. The American press gives a lengthy evaluation of the existing SSBN support system. Its effectiveness is underscored by the following figures: almost 70 per cent of the submarines are combat ready and up to 50 per cent of the authorized strength are constantly on wartime patrols at sea.

The basing and rear services system for SSBNs in the Atlantic is organized and functions in accordance with general principles established for both U.S. fleets - Atlantic and Pacific. However, it has its own peculiarities which are explained by the combat component of seabased missile forces and by the character of their daily activity. According to information in the naval handbook JANES FIGHTING SHIPS, all LAFAYETTE-Class SSBNs (31 units) are based in the Atlantic, of which 12 are armed with the TRIDENT-1 missile and 19

with the POSEIDON-C-3. OHIO-Class SSBNs, as they enter the fleet (NEVADA, the eighth ship of this class, has been undergoing sea trials since May, 1986,) are transferred to the Pacific Ocean and are attached to Submarine Squadron 17 (Bangor, Naval Base, Washington).

Overall responsibility for rear services for SSBNs falls on the Chief of Naval Operations, who decides issues associated with organization of bases and supply, through corresponding offices and directorates of the logistics command and fleet commanders. In the Atlantic, service for SSBNs is arranged by the Atlantic fleet commander, submarine force commander and by the SSBN squadron commander. For these purposes, to one degree or another, practically all elements of the fleet rear services system are used: naval bases, shipyards and ship repair facilities, weapon depots, supply centers, and combat training ranges, including missile firing ranges. In addition there is a range of items and components which are designated exclusively for SSBNs. These are: basing points, rear bases, tender and supply transports, missile storage depots and training centers.

From the beginning of U.S. SSBN deployment in the 1960s, their presence in the Atlantic has been organized around the principle of "dual basing," employing moving basing points and fixed rear systems. Thus for technical servicing of combat ready boats during the period between their patrols, is accomplished by moving (floating) systems (tenders), and the more complex types of repair or modernization, associated with recoring, or rearming with missiles of a newer type, are conducted at large scale activities within the overall rear services systems of the fleet.

SSBN service bases in the Atlantic are Charleston (Squadrons 16 and 18) and New London (Squadron 14). Within these bases are repair facilities, personnel augmentation and training centers for the crews. The missile depot for ballistic and tactical weapons is located at Charleston. According to the foreign press, within these depots they perform assembly, service and storage of the POSEIDON C-3 and TRIDENT-1 missiles. There also, following major overhaul, SSBNs and supply ships are loaded with missiles and torpedos. The latter deliver combat supplies to basing points as well as to the Eastern missile range (Cape Canaveral, Florida), where, after overhaul, the missile system on the submarine is checked, where preparations for a training missile firing goes on and where a training missile is fired.

In many American defense specialists' opinion, the system of rear services permits the U.S. Navy to maintain its established program of war patrols and SSBN repair.

While the LAFAYETTE-Class SSBNs are in the fleet, among combat ready forces, their war patrols are organized along a 100-day cycle with 68 days patrol at sea and 32 days in port. Between patrols, a change of crew takes place, along with preventive maintenance of ship systems and equipment and resupply. Checking the missiles is done in the depot, to which, after every SSBN patrol, a portion of the missiles is delivered by supply ship. In place of those taken for control purposes, there are, on the tenders, missiles already checked. In this fashion, following several patrol cycles, all the missiles will have been changed. Repair and inspection of systems, while the submarine is in port

between patrols, is done by the tender and the repair ship with periodic employment of specialists in ship repair activities.

Service life of the LAFAYETTE-Class SSBNs is 30 years. During this period three major overhauls will take place at shipyards in Portsmouth, New Hampshire; Newport News, Virginia; or Charleston, South Carolina. Each of these overhauls takes from 2 to 2.5 years. Following the overhaul and systems inspection, the SSBN goes to sea in coastal ranges, where they work out problems of combat preparedness and check their equipment and mechanisms under at sea conditions.

For a constant assurance of combat readiness of SSBNs, a system of mobile basing points has been developed, which is actually the concentration in one location of a tender, floating, drydock and repair ship. Such a site would, as a rule, service one squadron (8-10 submarines). The squadron commander at this site would also serve as the base commander. His staff is situated on the tender. A dispersal point, suitable for SSBNs, deployed outside the continental U.S. in the proximity of the U.S.S.R. territory and that of the Warsaw Pact region, is considered "forward deployed."

In the mobile bases in use in the Atlantic for SSBN squadrons there are four submarine tenders, three floating drydocks and repair ships and two supply ships.

The SIMON LAKE- and HUNLEY-Class tenders (two in each class), were constructed in the early 1960s. They are large specialized ships with broad capabilities for SSBN repair and crew service. Each tender is expected to service no more than 10 submarines, and can service 3 simultaneously, moored alongside. For this purpose there are about 50 different workshops, storage for missiles, torpedoes fuel and provisions, and lifting cranes. Of the four tenders, three are designated for submarine squadrons and one is normally in major overhaul. Basic characteristics are shown in the table.

BASIC CHARACTERISTICS OF TENDERS

NAME OF TENDER	DISPLACEMENT (FULL LOAD), TONS X 1,000	MAIN DIMENSIONS, M: LENGTH, BEAM, DRAFT	HIGHEST SPEED, KNOTS	CREW SIZE, (INCLUDING OFFICERS)	ARMAMENT
SIMON LAKE (1)	About 20	196.2 25.9 9.1	20	About 1,430 (95)	4 76-mm dual gun mounts
HUNLEY(2)	19	182.6 25.3 8.2	19	2,568 (144)	4 20-mm single mounts

1. Same class as CANOPUS
2. Same class as HOLLAND

Floating drydocks (one per squadron) are used to dock SSBNs between patrols to inspect the underwater body and do hull repair work. All the docks are sectionalized and their capacity depends upon the number of sections in use, consisting of 8,000 tons for the ALAMAGORDO and OAK RIDGE and 55,000 tons for the LOS ALAMOS.

SSBN tenders' supply ships transport cargo between rear service bases and the mobile bases. There are two such transports in the Atlantic, MARSHFIELD and VERA, which are converted VICTORY-Class cargo ships built during the Second World War. They are part of the Military Sealift Command. They displace (full displacement) 11,300 tons with a speed of 17 knots and a crew of 80-90 personnel. Each transport is equipped to carry 16 missiles as well as torpedoes, POL, including fuel for the tenders, and fresh provisions. Guards for these combat supplies during their loading, transport and unloading, is provided by a special detachment which is not a part of ship's company.

There are currently three mobile bases deployed in the Atlantic area; Holy Loch (Great Britain) (forward deployed), and Charleston and Kings Bay on the east coast of the U.S.

Holy Loch, the forward deployed mobile base, is located in Scotland. It has been used by U.S. SSBNs since 1961, by virtue of an agreement between the U.S. and the U.K. Submarine Squadron (SUBRON) 14, with 10 SSBNs armed with the POSEIDON C-3, is based at Holy Loch. Seven to eight submarines from this squadron are constantly on war patrols and 2-3 are at the base for service between patrols. The tender HUNLEY (AS-31), drydock LOS ALAMOS (AFDB-7), a repair ship as well as tugs, cutters and barges service the SSBNs. The squadron staff is located on the tender and a range of administrative services, depots and some housing is situated ashore.

The mobile base at Charlestown (South Caroline), located in the Naval Base area, on the right bank of the Cooper River, has been used to service SSBNs since 1965. SUBRON 18 is based here, which includes, in addition to submarines armed with the POSEIDON C-3 missile, the tender CANOPUS (AS-34) ALMAGORDO (ARDM 2), and other floating resources. Piers, equipped with lifting cranes and connected by rail to missile depots dispersed in the area, are used to service the SSBNs. The SSBN tender housing the squadron staff is moored at one of the piers.

THE KINGS BAY (GEORGIA) MOBILE BASE is designed to service submarines of the 16th squadron, which was redeployed from the forward base at Rota, Spain in mid-1979. The squadron includes LAFAYETTE-Class SSBNs, with TRIDENT-1 missiles instead of the POSEIDON C-3, the tender SIMON LAKE (AS-33), the dry-dock OAK RIDGE (ARDM 1) and other support vessels and equipment. As noted in the American press, construction of the base at Kings Bay stretched over a four period (1977-1981). During construction, the waterway, with its six-mile channel for SSBN transit to their anchorages, was deepened and widened to 92 m. At the same time, the alluvial moorings were equipped for SSBNs and auxiliary ships.

CONSTRUCTION OF THE KINGS BAY SSBN NAVAL BASE. An important element of the broad-gauged modernization of the maritime component of the strategic forces

has been the development of specialized SSBN bases. As the U.S. Navy sees it, there is a need to concentrate, at one site, all the shorebased items for effective repair and service of the SSBNs. In the Pentagon, they have reached the conclusion that improvement of SSBN technical characteristics, in combination with specialized bases for service, will substantively raise their operational performance and utility.

The first specialized SSBN base was built on the U.S. Pacific coast at Bangor in the early 1980s.(1) It serves SUBRON 17, whose OHIO-Class SSBNs are armed with TRIDENT-1.

The first submarines equipped with the TRIDENT-2, as the U.S. press has noted, will be deployed in the Atlantic. For them, according to a decision taken in 1980, by the Secretary of Defense, a specialized base will be constructed at Kings Bay on the U.S. East coast. It is planned that this facility come online in 1989, which coincides with the timeframe for arming submarines with TRIDENT-2.

In its staff and designation, Kings Bay is analogous to Bangor in terms of servicing one SSBN squadron of OHIO-Class boats. Furthermore, Kings Bay is intended to be used to base LAFAYETTE-Class SSBNs (SUBRON 16) until their retirement from the fleet following the course of their active service life in the 1990s.

In the U.S. estimate, the base will be the most expensive ever built for the Navy. Labor costs over the 10 year period beginning in 1981, will come to 1.6 billion dollars.

The overall area of Kings Bay naval base is almost 6,500 hectares [2,630 acres]. As a supplement to the piers, which are already there for the tenders and drydock for the mobile base of SBRON 16, the construction plan for the naval base includes a number of items, the most important of which is a repair-mooring facility, a protected pier, degaussing pier, a missile storage depot and a training center.

The repair-mooring facility intended for mooring, repair and service of SSBNs between patrols, consists of two piers 195 m long. They are equipped with lifting cranes and lifting systems to deliver provisions and equipment to the boat. It is planned to construct a dry dock (210 x 27 x 13 m) as well as shops and administrative buildings, including some for the squadron staff.

According to data in the foreign press, OHIO-Class SSBNs, for as long as they are in the fleet, will spend up to two-thirds of their time on patrol. Since the newer SSBNs have reactors with increased capacity, the number of major overhauls, compared to the LAFAYETTE-Class will be reduced to two, and the length of such an overhaul, according to the U.S. estimate, will not exceed one year. The industrial equipment of the base complex is aimed at conducting repairs in an aggregated fashion (replacement of defective components and apparatuses in complete blocks), by which it is expected that the length of repairs to SSBNs on the base will be shortened.

The protected pier is 183 m long and located in the southern part of the base along the shore and serves for offloading missiles and tactical weapns from the SSBNs, arriving from combat patrol, so that they may be further checked and serviced at the depot which is connected to the pier by a rail line. The pier has ferroconcrete protection against blast wave.

To control the magnetic field of the SSBNs and, if necessary, bringing the field into given limits, it is intended to build a degausssing station in the southern part of the base. It is intended that checks be conducted upon the submarine's return from patrol and before their return to sea after repairs and onloading of missiles and torpedoes.

The ballistic missile depot is designed to storage and service TRIDENT-1 and TRIDENT-2 missiles. TRIDENT-1 will be delivered by sea to Kings Bay from the stored reserve supplies in the existing depot at Charleston. For these missiles, there are in a 61-hectare [24.68-acre] area 40 warehouses and 8 industrial buildings. It is also planned to construct a complex near the current depot to collect, store and service TRIDENT-2 missiles, which will include 25 industrial buildings, workshops and 60 warehouses. TRIDENT-2s will be assembled at such a rate as to ensure equipping all SSBNs with them by 1989. To the south of the missile service complex they are planning to place a torpedo and antisubmarine missile depot.

The training center is intended for training the crews between patrols and hands-on training on the TRIDENT-2 missile system. Training laboratories and classes are expected to be equipped with simulators and devices which, according to American military press, will permit crews to gain experience both as individual specialists as well as combat crews in entirety. The center is expected to train 1,300 submarine specialists simultaneously.

During the course of establishing the base, housing, automobile roads and rail lines will be built along with the basic items of the base itself.

As noted in the foreign press, construction of offshore facilities and equipping the approaches to the base from the sea will require a great amount of dredging and alluvial work, which resulted from the peculiarities of the local relief at Kings Bay; the land area of the base is only tens of centimeters above sea level. Saint Mary's Entrance strait, linking the base with the ocean, has sloping banks and its natural depths will not permit access to SSBNs. In the reckoning of Western specialists, the overall volume of earth being moved during construction of the base facilities, piers and roads will exceed 15 million cubic meters. Part of the dredging work had already been done when fitting out for the mobile base of SUBRON 16. As projects during base construction they plan to widen to approach channel to 152 m and the turning basin to 183 m in the vicinity of the repair mooring complex. Along with this a depth no less than 12.8 m will be maintained all along the SSBN transit lanes.

The organization for naval base construction has continuously been a special detachment created in 1974, on the Navy logistics command staff, for project management and construction supervision of the first SSBN base at Bangor. In 1979, it was assigned the task of designing a project for a submarine base on

the Atlantic coast and after the location for building the base at Kings Bay was approved, they redeployed to that construction region. The detachment numbers 220 persons including 20 combat specialists.

Pentagon specialists consider that the increase in effectiveness in servicing the new submarines between patrols permits a change in the ratio between extended periods on patrol at sea and the time between patrols under repair for one patrol cycle which for the OHIO-Class SSBN is 95 days; 70 at sea and 25 in port.

In the overall course of developing seabased strategic missile forces, the aggressive essense of U.S. military preparations is sharply reflected. The maintenance of the established regimen of SSBN combat patrols, and their technical capability to apply missile weaponry against the Soviet Union and the other countries of the Warsaw pact, such is the main problem for the rear services system and in so doing is a contribution the White House's policy of threat and inflammation of tension. Construction of an organization of bases for SSBNs in the Atlantic is aimed at solving this problem, according to the foreign press, with the objective of getting away from a two-stage servicing toward service complexes in specialized SSBN bases.

The growing nuclear threat from beneath the sea places before the soviet troops and troops of the armies of the countries of the socialist community, the problem of increasing their vigilance and professional skill, and always to be in a state of preparedness to disrupt the realization of the criminal plans of the imperialists.

1. For details about this see FOREIGN MILITARY REVIEW, 1986, No 2, pp 73-76.

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U.S. EXPENDITURES IN FY-87 ON MILITARY CONSTRUCTION ABROAD

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 9, Sep 86 (Signed to press 10 Sep 86) pp 73-74

[Article by Col V. Elin; "U.S. Expenditures in FY-87 on Military Construction Abroad"]

[Text] The unprecedented growth of military expenditures, both in the individual NATO countries, and in the bloc as a whole, is clear manifestation of imperialism's aggressivness. U.S. leadership is paying much attention to this aspect of the build up of military power as the development on someone else's territories of fixed installations and structures designed for the material, technical, billeting, medical and other types of support for the armed forces, and the organization of a peacetime training process, and also for creating conditions conducive to the rapid deployment of forces, the movement of reinforcement units and the conduct of combat operations in case of war.

The Pentagon planned to allocate 1,900 million dollars for military construction abroad in FY-87. Of these, 1,400 million, or 73 per cent will be spent in Western Europe. Included in this sum is the U.S. payment (247 million dollars) to a special NATO monetary fund being channeled into programs to develop the bloc's infrastructure. The U.S.'s share in the financing of these programs is about 28 per cent while 35-40 per cent of this fund's resources will be spent for the support of American forces activities.

During 1985-1990, it is planned to create primary installations for the combat support of all tactical aviation reinforcements arriving from the American continent, to construct more than 600 steel-reinforced concrete aircraft shelters, and also to continue the work to stockpile reserves of material resources in advance.

According to announcements of Pentagon representatives, the huge financial resources which are ear marked, and the expenditures which must be paid from the NATO budget, are supposedly insufficient to satisfy the top priority requirements of the U.S. armed forces in Europe. Therefore, the U.S. will still be in a unilateral position to appropriate resources for the construction of administrative and living quarters and the other installations necessary for the functioning of the armed forces in peacetime.

The deployment of 48 American cruise missiles to the air base at Wundstrecht, The Netherlands is being provided for by the allocation, in FY-87, of an additional 34 million dollars. The total expenditure is estimated at nearly 114 million dollars, of these two-thirds will be paid by the U.S., and the remainder, from the general NATO funds, and at the same time, it is planned to carry out the reconstruction in a compressed time frame.

Construction work at a number of cruise missile bases in other countries are beginning to be curtailed. Judging by foreign press data, this is explained by the fact that many installations in them are already in commission. Nevertheless, it is planned to spend 30 million dollars on improving five missile bases in Belgium, the FRG, Italy and Great Britain.

Forty-five million dollars are being requested to reequip positions and provide greater security for medium-range PERSHING-2 ballistic missile bases in the FRG.

More than 410 million dollars are proposed to improve the bases and installations in the Far East and Pacific region.

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U.S. NAVY IN FY-86

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 9, Sep 86 (Signed to press 10 Sep 86) p 75

[Article by Capt 1st Rank V. Chertanov; "The U.S. Navy in FY-86"]

[Text] The final sessions of the Senate and the House of Representatives of the U.S. Congress, according to the navy budget for FY-86, as emphasized in the American press, did not introduce substantial changes in the program developed by the naval leadership for the further build up of the fleet and the marine corps.

In the area of shipbuilding, appropriations were approved for the construction of the next OHIO-Class SSBN, 4 LOS ANGELES-Class multipurpose nuclear submarines, 3 TICONDEROGA-Class guided missile cruisers, 3 WHIDBEY ISLAND-Class landing ship transport-dock, 2 STALWART-Class hydroacoustic research ships, 2 AVENGER-Class minesweepers, 2 oilers and 12 air cushion landing ships (LCAC), and also advance appropriations to build the ARLEIGH BURKE-Class of guided missile destroyers (on the scale of 74 million dollars) and to bring WISCONSIN, the fourth IOWA-Class battleship out of mothballs and requip it (469 million). Additional funds (852.1 million dollars) have been released to improve sea transport resources.

Recognizing the great importance of the marines in U.S. neoglobal policies, the Congress left practically unchanged the financing for the purchses of weapons and military equipment for that branch of the naval forces.

Appropriations for naval aviation equipment are in accordance with the program provide for the purchase in 1986, of 9 P-3C ORION ASW aircraft, 84 F-18 HORNET fighter-bombers, 11 A-6E INTRUDER ground-attack aircraft, 12 EA-6B PROWLER EW aircraft, 18 F-14 TOMCAT fighters, 6 E-2C HAWKEYE AWACS aircraft, 18 SH-60B SEA HAWK ASW helicopters, 12 UC-12V light transport aircraft and 8 C-2 transport aircraft, 14 CH-53E and MH-53E SUPER STALLION heavy transport helicopters, and 22 AH-1 SEA COBRA helicopter gunships, and also 19 of 38 T-34C trainers.

Overall, according to Western reviewers' opinions, the naval forces not only lost nothing from the draft budget presented to the Congress, but received an additional 0.8 billion dollars for the ship building programs which signifies the next round in the arms race.

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AIR NATIONAL GUARD CREWS IN EUROPE

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 9, Sep 86 (Signed to press 10 Sep 86) p 75

[Article by Col V. Kondratyev; "Air National Guard Crews in Europe"]

[Text] The air national guard is the most powerful reserve component of the U.S. Air Force. It comprises more than 90 air squadrons, which have more than 1,500 fixed- and rotary-wing aircraft and more than 1,100 of them are combat aircraft (tactical fighters, ground-attack, air defense interceptors, air reconnaissance and EW aircraft).

Air national guard subunits play an active part in practically all the large-scale operational efforts (exercises, maneuvers, etc.), being carried out by the air force command both on a national scale and within the framework of NATO. Specifically, they regularly are brought into the exercises of the joint NATO forces in the European TVDs to strengthen the aviation groupings deployed in them. At the same time, their crews fly across the ocean and execute combat missions under European conditions.

Recently, the Pentagon is using air national guard units and subunits more widely in these efforts. And what is more, according to foreign press information, in the spring of 1986, the crews of several them began performing combat tours of duty in the NATO air defense system. Specifically, in May of that year, the first eight F-4 aircraft arrived at Ramstein Airbase (FRG): 2 from the 148th Fighter Group (permanently based at the airport of Duluth, Minnesota), 3 from the 144th Fighter Wing (Fresno, California), and 3 from the 119th Fighter Group (Fargo, South Dakota). In the future, they will be replaced by crews from the 107th Fighter Group (Niagra Falls, New York), 142nd Fighter Group (Portland, Oregon), 147th Fighter Group (Houston, Texas), 191st Fighter Group (Selfridge, Michigan) and the 154th Composite Air Group (Honolulu, Hawaii).

Western military observers believe that the above mentioned subunits will perform combat tours of duty at the Ramstein Airbase before finishing the transition from the F-4E to the F-16, of the 86th Fighter Wing which is deployed here, and is being introduced into the U.S. Air Force Command's inventory in the European zone.

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EMPLOYING PORTABLE AIR DEFENSE BATTERIES ON SHIPS

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 9, Sep 86 (Signed to press 10 Sep 86) pp 76-77

[Article by Capt 2nd Rank V. Mosalev ; "Employing Portable Air Defense Batteries on Ships"]

[Text] Recently, in the navies of a number of capitalist countries, they have begun to arm combatants, primarily those which operate in coastal waters, with portable air defense batteries (PZRK) designed to combat low-flying air targets. Thus, according to information in the foreign press, several SIXTH FLEET ships have been armed with the STINGER PZRK, and the British ships in the region of the Persian Gulf, with the JAVELIN PZRK. These PZRKs are serviced by the attached marines. In other countries, small ships, on which it is not possible to install the standard air defense battery, are being armed with them. For example, the RBS70 PZRK has been installed on Swedish minesweepers, and the RED EYE on Spanish patrol boats. In connection with the air raids by Iranian aviation on civilian ships in the Persian Gulf, individual combatants, and also merchant ships of Kuwait and Saudi Arabia began to be outfitted with American STINGER PZRKs. The main tactical and technical characteristics of the PZRKs being employed on combatants is presented in the table.

The STINGER missile has a fragmentation-HE war head, a passive dual (infrared and ultraviolet) seeker which permits using it under conditions of IR countermeasures. the PZRK has an IFF system and can destroy low flying air targets on meeting or overtaking courses.

REDEYE destroys low flying targets only on overtaking courses and has no recognition system. REDEYE is equipped with an IR seeker. Both American missiles are launched from the shoulder and can be used in good visibility.

The JAVELIN is an improved version of the BLOWPIPE missile and has a fragmentation-HE war head. The PZRK has a semi-automatic radio command system, an IFF system; it is used in conditions of good visibility; it is fired from the shoulder or tripod on meeting or overtaking courses. At the present time, an infrared sight has been developed for the PZRK for firing at night, and a target identification system is being developed.

PRINCIPAL TACTICAL-TECHNICAL CHARACTERISTICS OF PZRKS

Name, Designation, Country of Origin	Launch wgt / Total wgt of Installation, kg	Length of Canister / Missile Diameter, mm	Maximum Speed, m/sec. Missile / Target	Firing Range / Altitude for Destroying the Target, m	Crew Size
STINGER FIM-92 (U.S.)	9.5 / 13.3	1,520 / 70	700 / 400	5,200 / 3,500	2
REDEYE FIM-43 (U.S.)	8.2 / 13	1,280 / 70	530 / 230	4,100 / 2,500	2
JAVELIN (Great Britain)	15.4 / 24.1	1,400 / 76	700 / 300	5,000 / 2,000	3
RBS70 (Sweden)	15 / 80	1,320 / 106	525 / 320	5,000 / 3,000	3

The RBS70 missile has a fragmentation warhead with an impact or laser influence exploder, aimed by a laser beam. The installation has an optical sight and an identification system used under conditions of good visibilty, firing is conducted on meeting and overtaking courses, and the missile is launched from a tripod.

In Great Britain, a fixed shipboard SEA JAVELIN installation is being developed on the basis of the JAVELIN, and in France, the SADRAL air defense installation is being developed, based on the MISTRAL guided missile for arming torpedo boats and ships of small displacement.

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